Annex D: Materiel

INTRODUCTION

Annex D of the *2007 Army Modernization Plan* (AMP) provides an overview of key Army materiel programs funded in President's Budget '08 to develop and field new equipment systems, provide incremental improvements to existing systems, or recapitalize existing fielded systems by rebuilding to a zero-miles/-hours condition and upgrading system capabilities.

These programs are framed within the six joint functional concept capability categories used by the Joint Capabilities Integration and Development System (JCIDS) process to analyze Joint Force future requirements and guide Army and other Service modernization efforts towards those requirements as they emerge. They are also part of a comprehensive and integrated doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) modernization solution to enhance capability within two of the Army's four overarching, interrelated strategies: (1) providing relevant and ready land power, and (2) train and equip Soldiers and grow adaptive leaders.

EVOLUTIONARY ACQUISITION AND DEVELOPMENTAL PROCESSES

Evolutionary Acquisition is the DoD-preferred strategy being used by the Army to rapidly acquire materiel systems with mature technologies. This strategy delivers capabilities in increments, while recognizing that follow-on improvements in capability will be acquired. The objectives are to align needs and capabilities with resources, and to put capabilities into the hands of the user quickly, while balancing technological insertions with consistent improvements in doctrine, organizations, and technology development. Success of this strategy depends on a systematic, continuous, definition of requirements, timely mature technologies, and continuous collaboration between uses, testers, and developers.

Evolutionary acquisition uses two key processes, incremental development and iterative development and insertions, to provide for continuous discovery and development of technology for military applications that enhance Joint force capabilities.

Through the incremental development process, a desired capability is identified and the required end state is defined. That requirement is met over time by the development of several increments, each dependent on available mature technology. The requirement for future increments is based on the ability to fill the gap between the current capability and the objective capability (100 percent design concept) for a system.

Through the iterative development and insertion process, a desired capability is identified, but the end-state requirements are unknown at program initiation. Those requirements are refined through experimentation, risk management, and continuous user feedback to provide the best possible capability within an increment. The requirement for future iterative development and insertion depends on both validated user feedback and ensuing technology maturation. Both processes require close coordination between materiel and training developers to ensure training products and plans support the new capabilities and any iterative developments and insertions applied outside an increment cycle to existing systems.

JOINT TRANSFORMATIONAL CAPABILITIES ALIGNMENT FOR THE FUTURE JOINT FORCE

The Army is modernizing its current Modular Force to ensure the Joint force meets near-term operational challenges, while continuously pursuing transformational changes to develop a Future Combat Force. JCIDS is the top-down Joint capabilities-based requirements generation

process that guides all Services' investment in transformational capabilities for the future Joint force.

The overarching Capstone Concepts for Joint Operations is the first step in this process, and is a unifying framework for developing supporting Service concepts; subordinate Joint operational, functional, and enabling concepts; and a set of integrated operational, technical, and system architectures that looks at existing, evolving, and future Joint force requirements. It provides the operational context for transformation by linking strategic guidance with the integrated application of Joint force capabilities. It also describes how the Joint force intends to operate across the range of operations from 2012 to 2025.

CAPABILITIES NEEDS ANALYSIS

Complementing JCIDS and the Capabilities Development Community, the Army Capabilities Integration Center, in coordination with TRADOC, the Combined Arms Center and all TRADOC proponents, conducts an annual Future Force Capabilities Needs Analysis (CNA) of Joint and Army requirements derived from the Joint Functional Concepts. CNA is a macro-level approach that establishes a baseline of Joint- and Army-required capabilities extracted from approved Joint Concepts, assesses the risk to mission success should these capabilities not be performed, identifies and assesses value of programmed DOTMLPF solutions essential to supporting Army operations, and identifies capability gaps.

CNA results are used by TRADOC and Department of the Army Program Objective Memorandum (POM) development, The Army Plan (TAP) development, DOTMLPF capabilities developments, priorities, S&T strategy, and related current force gap analysis. The process also identifies capabilities in which operational risk can be accepted using the latest Army guidance, such as TAP risk framework. The CNA process is coordinated with TRADOC headquarters and proponents, the Army Staff, U.S. Joint Forces Command (J-9), and Joint Staff J-8. Army G-8 Force Development Directorate's adaptation of the CNA will provide an accurate assessment of closing Future Force gaps and sustaining required capabilities during each program planning cycle.

JOINT FUNCTIONAL CONCEPTS

Each appendix to this annex is aligned with one of the following six Joint functional concepts, which describe approaches for providing specific military capabilities across the full range of military operations.

- Force Application
- Protection
- Focused Logistics
- Battlespace Awareness (BA)
- Command and Control (C2)
- Net-Centric

Under JCIDS, J-8 uses these functional capability categories to focus Joint analysis. Programs that provide more than one functional capability are assigned a lead Joint Warfighting Capability Assessment (JWCA) team with one or more supporting JWCAs to conduct up-front of proposed concepts and DOTMLPF solutions. A designated Functional Capability Board, which is also aligned with one of these emerging Joint Functional Concepts, validates this analysis and forwards recommendations to the Joint Requirements Panel and Joint Requirements Oversight Council that provides top-down guidance and direction to the Services on their respective modernization programs.

The following describes materiel programs in various phases of the acquisition management lifecycle. All Army materiel programs with more than one functional capability are described only once within an appropriate functional capability appendix, as aligned in the equipping and resourcing framework used to organize the Army equipping program. The numbers in parenthesis reflect the Adjusted-Capabilities Needs Analysis

(A-CNA) 09-13 results. These numbers represent the user's prioritized list of DOTMLPF solutions required to meet the Army's part of the Joint Force Land Component operational mission:

APPENDIX 1–FORCE APPLICATION:

Force Application is the sum of all actions taken to cause desired effects on our adversaries, and encompasses all aspects of fires and maneuvers that suppress, neutralize, seize, or destroy an objective. Appendix 1 provides a description and status of the following PB '08-funded materiel programs:

AVIATION MODERNIZATION

AH-64 Apache (24)

Armed Reconnaissance Helicopter (34)

Lakota Light Utility Helicopter (Initiative–COTS)

UH-60 Black Hawk (41)

CH-47 Chinook (39)

Fixed Wing (32)

Hellfire Family of Missiles (126)

UNMANNED AIRCRAFT SYSTEMS

Extended Range/Multi-Purpose Unmanned Aircraft System (25)

Small Unmanned Aircraft System (48)

Aircraft Survivability Equipment (255)

Aviation Electronics (4/113/183/338)

Aircrew Integrated Systems

Air Traffic Services/Army Airspace Command and Control (62)

Aviation Ground Support Equipment

Aircraft Component Improvement Program

SOLDIER MODERNIZATION

Soldier as a System

Ground Soldier System

Air Warrior

Mounted Soldier System

Explosive Ordnance Disposal Family of Systems

Combat Identification

Thermal Weapon Sights

Enhanced Night Vision Goggles

Counter-defilade Weapons and Improved Ammunition

M2 Heavy Barrel (Enhanced) .50 caliber Machine Gun (118)

XM101 Common Remotely Operated Weapon Station

XM110 7.62 Semi-Automatic Sniper System

XM150 Rifle Combat Optic

XM26 12 Gauge Modular Accessory Shotgun System

XM320 Grenade Launcher Module

Lightweight Laser Designator Range Finder (55)

Non-lethal Capabilities Set

GROUND FORCE MODERNIZATION

Abrams Tank (68)

Bradley Fighting Vehicle (71)

Stryker Family of Armored Vehicles (78)

M777A1 Lightweight 155 Howitzer (301)

M119A2 Lightweight 105mm Towed Howitzer

Future Combat Systems 1 (1)

M117 Armored Security Vehicle (67)

Paladin/Field Artillery Ammunition Supply Vehicle (138)

Non-Line-of-Sight Cannon (1)

Non-Line-of-Sight Launch System (1)

High Mobility Artillery Rocket System (105)

Chemical Energy Missiles—Javelin (79)

Chemical Energy Missiles—TOW 2B (133)

Improved Target Acquisition System (170)

Guided Multiple Launch Rocket System Rocket (231/232)

M982 Excalibur (43)

Precision Guidance Kit (44)

Mid-Range Munitions (42)

APPENDIX 2–PROTECTION:

Protection prevents an adversaries' effects on us, and includes personnel and infrastructure protection, nonproliferation and counter proliferation, and consequence management capabilities. Appendix 2 provides a description and status of the following PB '08-funded materiel programs:

AIR AND MISSILE DEFENSE (AMD) MODERNIZATION

PAC-3/MEADS Combined Aggregate Program (110)

Terminal High-Altitude Area Defense (38)

Surface-Launched Advanced Medium-Range Air-to-Air Missile (59)

Ground-Based Midcourse Defense Segment

Counter-Rocket, Artillery and Mortar (86)

Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) (37)

Sentinel (184)

Air and Missile Defense Planning and Control System (14)

Forward Area Air Defense-Command and Control (22)

Air Defense and Airspace Management Cell (36)

Joint Tactical Ground Station Multi-Mission Mobile Processor (352)

Army Integrated Air and Missile Defense Battle Management Command, Control, Communications, Computers, and Intelligence

FIREFINDER SYSTEMS MODERNIZATION

AN/TPQ 48 Lightweight Counter Mortar Locating Radar (51)

AN/TPQ 37 Artillery Locating Radar (431)

AN/TPQ 36 Mortar Locating Radar (241)

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR (CBRN) DEFENSE MODERNIZATION

M31A1/M31E2 Biological Integrated Detection System

Nuclear, Biological, and Chemical Reconnaissance Vehicle - Stryker (75)

Joint CBRN Dismountable Reconnaissance System

M56 Coyote Wheeled Smoke System (249)

M6/M7 Vehicle Obscuration Smoke Systems

Chemical Biological Protection Shelter System

Chemically Protected Deployable Medical System (112)

Joint Chemical Agent Detector (95)

Joint Chemical, Biological, and Radiological Agent Water Monitor

Joint Warning and Reporting Network (21)

Joint Effects Model (93)

Joint Service Transportable Decontamination System (403)

Joint Service Personnel/Skin Decontamination System (411)

Joint Portable Decontamination System (400)

Joint Platform Interior Decontamination (212)

Joint Service Sensitive Equipment Decontamination System (412)

Joint Service General Purpose Mask (165)

Joint Biological Agent Identification and Diagnostic System

National Guard Weapons of Mass Destruction-Civil Support Team Unified Command Suite (315)

National Guard Weapons of Mass Destruction Civil Support Team Analytical Laboratory Suite (216)

CBRNE Installation Protection Program (Facilities)

APPENDIX 3-FOCUSED LOGISTICS:

Focused Logistics involves deploying, sustaining, and supporting the Force. Appendix 3 provides a description and status of the following PB '08-funded materiel programs:

UNITY OF EFFORT MODERNIZATION

Global Combat Support System-Army (23)

Battle Command Sustainment Support System (18)

Medical Communications for Combat Casualty Care System (208)

DOMAIN-WIDE VISIBILITY MODERNIZATION

Movement Tracking System (89)

Property Book Unit Supply Enhanced (298)

Standard Army Maintenance System (306)

RAPID AND PRECISE RESPONSE MODERNIZATION

Joint High Speed Vessel (formerly, Theater Support Vessel) (66)

Joint Precision Airdrop Systems (87)

Advanced Aviation Forward Area Refueling System (169)

Petroleum Quality Analysis System (415)

Tactical Electric Power (250/251/252)

Standard Automotive Tool Set (391)

Family of Medium Tactical Vehicles (92)

High Mobility Multipurpose Wheeled Vehicle (90/172)

Heavy Expanded Mobility Tactical Truck (91/176/199/210/290)

Palletized Load System (264/321)

Containerized Kitchen(334)

Camel Unit Water Pod System (387)

Hippo Load Handling System Compatible Water Tank Rack System (258)

1,500-GPH Tactical Water Purification System (373)

Container/Material Handling Equipment (131)

Next Generation Automatic Test System

Maintenance Support Device (344)

General Purpose Electronic Test Equipment (343)

Man-Transportable Robotic System (156)

Forward Repair System (282)

Shop Equipment Welding

ASSURED MOBILITY MODERNIZATION

AN/PSS-14 Handheld Standoff Mine Detection System (247)

Ground Standoff Minefield Detection System (359)

Airborne Surveillance, Target Acquisition, and Minefield Detection System (114)

Route Clearance Vehicles (82/83/84)

Intelligent Munitions System (IMS) (81)

Spider (Anti-personnel Landmine Alternative) (188)

Improved Ribbon Bridge (319)

Rapidly Emplaced Bridge System (211)

Dry Support Bridge (128)

Tactical Wheeled Vehicle Force Protection (187)

Mine Resistant Ambush Protected Vehicle

APPENDIX 4–BATTLESPACE AWARENESS (BA):

BA describes the collection, analysis, and processing of battlespace information, and includes all source intelligence collection, environmental data collection, predictive analysis, and knowledge management. Appendix 4 provides a description and status of the following PB '08-funded materiel programs:

Space Support Enhancement Toolset

COBRA-Based Grenadier BRAT and Mini-Transmitter Blue Force Tracking System

Distributed Common Ground System-Army (15)

All Source Analysis System (29)

Aerial Common Sensor (85)

Advanced Field Artillery Tactical Data System (17)

Long-Range Advanced Scout Surveillance System (58)

M1200 Armored Knight Fire Support Vehicle (248)

Tactical Exploitation System (207)

Integrated Meteorological System (16)

Trojan Special Purpose Integrated Remote Intelligence Terminal (Trojan SPIRIT) (70)

Prophet (147/148)

Tactical Unmanned Aerial Vehicle Shadow 200 (52)

Counterintelligence/Human Intelligence Information Management System (60)

Sequoyah Foreign Language Translation System (143)

APPENDIX 5–COMMAND AND CONTROL:

Command and control (C2) describes mission planning and execution, and includes common operational picture (COP), Joint C2, communications and computer environment, and information collection. Appendix 5 provides a description and status of the following PB '08-funded materiel programs:

Army Battle Command System (7)

Global Command and Control System-Army (12)

Network-Enabled Command Capability (12)

Mounted Battle Command on the Move (63)

Maneuver Control System (13)

Command Post of the Future (Initiative–S&T)

Standardized Integrated Command Post System (64)

Army Airborne Command and Control System (62)

Space Support Enhancement Toolkit (Initiative–COTS)

COBRA-Based Blue Force Tracking Systems and Supporting Architecture

Force XXI Battle Command Brigade and Below (19)

Single Channel Ground and Airborne Radio System (11)

APPENDIX 6–NET-CENTRIC:

Net-centric capabilities help provide universal access to all relevant authorities, assets and capabilities, enabling commanders to effectively

coordinate battlefield effects and maintain full-spectrum dominance and decision superiority. Net-centric capabilities include integrated information systems and supporting information infrastructure. Appendix 6 provides a description and status of the following PB '08-funded materiel programs:

Satellite Communications (320/326/419)

Combat Service Support Satellite Communications

Global Positioning System (416)

Warfighter Information Network-Tactical (3)

Joint Tactical Radio System (4)

Bridge-to-the-Future Network (8)

Joint Network Node

Joint Network Management Systems (6)

Integrated Systems Control (9)

Appendix 1: Force Application

Force application encompasses all aspects of fires and maneuvers that suppress, neutralize, seize, or destroy an objective in any domain—to include land, maritime, space, and cyberspace using conventional and unconventional weapons. These actions are enabled by offensive information operations, as well as space, airborne, and ground-based systems that provide robust command, control, communications, and computer and intelligence, surveillance and reconnaissance.

This appendix briefly discusses the Army's force application capabilities that provide the Joint force dominant air and ground maneuver, coupled with precision engagement and the key materiel programs associated with these capabilities. While materiel programs that support operational maneuver from strategic distances and assure mobility are force application capabilities supporting dominant maneuver, these programs are described in this annex under Appendix 3, given that deployment distribution and mobility are areas within Focused Logistics.

AVIATION CAPABILITIES

With its manned and unmanned assets, aviation organizations develop situations both in and out of enemy contact, maneuver to positions of advantage, engage enemy forces beyond their weapons' range, destroy them with precision fires, and provide close support. Their inherent mobility, flexibility, agility, lethality and versatility are instrumental in enabling the air-ground task force commander to conduct decisive Joint operations.

AVIATION MODERNIZATION

Modernization and recapitalization of existing aviation systems projected to remain in the fleet into the 2015-25 timeframe are essential to supporting current as well as future operations. The urgent need to address the steadily deteriorating condition of the aviation fleet and accelerate Reserve Component modernization is being addressed through an aviation transformation plan which:

- Aligns aviation structure and resources to comply with Future Force requirements, including Unmanned Aircraft System (UAS)
- Accelerates divestiture of non-modernized aircraft (UH-1, OH-58D and OH-58A/C)

- Accelerates Active Component and Reserve Component aviation modernization efforts
- Restructures and standardizes attack and lift formations across the force
- Leverages new training technologies to maintain crew proficiency
- Invests in improvements for aircraft and UAS reliability and maintainability
- Procures new UH-60Ms to accelerate fielding of utility aircraft to the Army National Guard
- Procures LUHs to divest aging UH-1s and OH-58A/Cs primarily found in the Army National Guard
- Converts an additional 96 AH-64As located in U.S. Army Reserve and Army National Guard units to AH-64Ds
- Procures Armed Reconnaissance Helicopters (ARH) to divest the OH-58D KWs and converts four Army National Guard AH-64A battalions to ARH
- Procures the Future Cargo Aircraft to replace an aging fixed-wing fleet
- Procures Extended Range/Multi-Purpose and Small Unmanned Aircraft Systems
- Invests in future (post-2025) joint solutions such as Joint Multi-Role, and potentially a new Joint Medium Lift aircraft
- Continues to upgrade the aviation force with an improved infrared countermeasure suite capable of defeating the most advanced threat man-portable air defense system
- Converts CH-47D heavy-lift helicopter fleet to the CH-47F model with improved avionics, engines and airframe components

FUTURE COMBAT FORCE AVIATION

The Army envisions organizing aviation assets into brigade formations at division-and corps-levels. Teaming UAS with manned systems will enhance operational fires, maneuver, and intelligence collection capabilities for the commander. Future Force aviation modernization efforts incorporate lessons learned, the changing operational environment, and emerging Joint force requirements. They leverage key technologies in areas such as electronics, communications, and automation open systems architectures, UAS interoperability, propulsion systems and weaponization. These efforts include:

- Fielding Small Unmanned Aircraft System, Tactical Unmanned Aerial Vehicle Shadow, Extended Range Multipurpose Warrior, and FCS Class I and IV UAS
- Ensuring digital interoperability for effective Joint/combined force operations
- Fielding effective, affordable systems that enhance aviation survivability and improve Soldier stamina
- Improving aircraft operational readiness by leveraging technology to reduce costs and extend aircraft service life; strategy includes pursuit condition-based maintenance plus (CBM+) initiatives such as the aircraft component improvement program, digital source collection and health usage monitoring
- Replacing obsolete air-traffic services equipment and maintaining compliance with future airspace usage requirements
- Digitizing aviation logistics and modernizing aviation ground support equipment and improving training
- Developing the technologies to ensure fielding of unmanned systems, interoperability of manned/unmanned aircraft, and next generation and future system development
- Leveraging technology to reduce costs, extend aircraft service life, and improve training
- Replacing OH-58D aircraft with the Armed Reconnaissance Helicopter to correct numerous capability gaps (interoperability,

survivability, agility, versatility, lethality and sustainability)

- Procuring new UH-60M/HH-60M aircraft to grow fleet size to meet modular force requirements; refresh the Black Hawk fleet by reducing the average age of the fleet while providing improved technology that increases reliability, maintainability and sustainability
- Replacing three aging fixed-wing aircraft (C-12, C-23 and C-26) with Joint Cargo Aircraft and a Future Utility Aircraft
- Continual modernization of the AH-64D to a Block III configuration with greater capabilities and increased reliability
- Remanufacturing 120 A Model Apaches to Apache Block II Longbow configuration
- Replacing aging UH-1 and OH-58 aircraft with a COTS Light Utility Helicopter
- Modernizing the CH-47D heavy-lift helicopter fleet with new-build and remanufactured CH-47F aircraft that incorporate updated avionics and major airframe improvements

DISCUSSION OF KEY AVIATION MATERIEL PROGRAMS

AH-64 APACHE ATTACK HELICOPTER

The AH-64 Apache is the Army's heavy attack helicopter assigned to attack battalions and regimental aviation squadrons in both the Active and Reserve Component. Apache is a two-pilot, twin-engine attack helicopter designed to meet the current mission requirements for reconnaissance and attack worldwide, day or night, under obscured battlefield and/or adverse weather conditions. The upgraded AH-64D Longbow began fielding in 1998. The AH-64D upgrades, among other improvements, add a millimeter wave Fire Control Radar (FCR), Radar Frequency Interferometer (RFI), fire-and-forget radar-guided missile, and cockpit management and digitization enhancements. The combination of FCR, RFI, and the advanced navigation and avionics suite provides increased SA, lethality, and survivability.

The Apache-focused recapitalization program integrates a number of related initiatives to produce and/or retrofit aircraft across the Apache fleet to meet the objectives of the Army's recapitalization policy and to address lessons learned from recent combat operations and deployments. This program applies reliability and safety modifications, increases aircraft life by addressing high-maintenance demand/operating and support cost drivers and incorporating a second-generation forward-looking infrared (FLIR) with the Modernized Target Acquisition Designation Sight/Pilot Night Vision Sensor.

The program goals are to reduce the overall average airframe age of the fleet to the half-life metric of 10 years by 2010, increase the unscheduled mean time between removal rate by 20 percent for selected recapitalized components, and maximize the return on recapped components by 20 percent.

Program Status. Remanufacture of 621 AH-64As to the AH-64D Longbow configuration will be complete in FY10. Multi-year I delivered 232 AH-64Ds through FY02. A second multi-year contract for an additional 269 AH-64Ds with deliveries through FY06 was signed in October 2000. In January 2007, the first of 120 AH-64A model Apaches was inducted for conversions to the D model Longbow configuration. This will continue thru FY10. Deliveries will begin in FY08 and end in FY11. In September 2005, a contract was signed to provide 13 wartime replacement aircraft in FY07. Subsequently, the Army has been funded for 32 additional War Replacement Aircraft with three deliveries in FY08, 11 in FY09 and 18 in FY10.

ARMED RECONNAISSANCE HELICOPTER (ARH)

The mission of ARH is to provide a robust reconnaissance and security capability for the Joint combined arms air-ground maneuver team. The ARH program was established to correct OH-58D capability gaps for use in reconnaissance. As a

result of Aviation Focus Group analysis, the Chief of Staff, Army in February 2004, identified the need for 368 ARH aircraft to replace the existing OH-58D fleet. The requirement has since grown to 512 aircraft.

Program Status. ARH's first flight was 20 July 2006. Efforts included integration of non-developmental item subsystems onto an existing helicopter platform and developmental/operational testing and qualification. Limited Users Test is scheduled for early 2007, with Milestone C low-rate initial production (LRIP) decision scheduled for May 2007. First Unit Equipped is scheduled June 2009.

LAKOTA LIGHT UTILITY HELICOPTER (LUH)

Lakota is a light, commercially procured aircraft designed to perform a variety of missions—from Joint to nongovernmental to homeland security and Force medical evacuation operations. It is the newest aircraft in the Army's inventory. The Army intends to procure and field 322 Lakotas from FY06-15; estimated cost of the LUH program is $5 billion. LUH is designed to transport two crew and six Soldiers. Additional configurations include two NATO litters with patients and one medical attendant. The aircraft has a hoist for use in emergency evacuations. The Army National Guard will be the primary user of the LUH, conducting missions in support of homeland security such as civil search and rescue, medical evacuation, and counter-drug operations.

Program Status. On 13 February 2006, OSD delegated the LUH program to the Army as an Acquisition Category (ACAT) 1C (COTS). The Milestone C/LRIP was awarded June 2006. FUE is scheduled May 2007.

UH-60 BLACK HAWK

With its 28 configurations and mission equipment package variants, the UH-60 Black Hawk is the Army's current and Future Force utility and MEDEVAC helicopter. The UH-60 fleet is comprised of 1,619 aircraft. There are 956 UH-60A models, which began production in 1977; 659 UH-60L models, which began production in 1989; four UH-60M, which began production in 2005. The Black Hawk can transport 11 fully equipped combat troops, plus an external load up to 8,000 lbs (UH-60A) and 9,000 lbs (UH-60L). The UH-60 provides rapid and agile maneuver capability through air assault, general support, airborne C2, and MEDEVAC, providing commanders the ability to initiate, conduct and sustain combat operations by providing internal and/or external lift of troops, weapon systems, supplies and equipment.

In the airborne C2 role, it provides full Joint and combined interoperability with other C4ISR elements. The Army will procure the UH-60M/HH-60M (MEDEVAC variant) to extend fleet capabilities thru 2025, incorporate Global Air Traffic Management requirements and extend aircraft life.

Program Status. The UH-60M and HH-60M programs have received Milestone C LRIP approval and expect full-rate production decision in May 2007. FUE for UH-60M is FY08. The accelerated development of new technologies has resulted in an upgrade program for the UH-60M that will include fly-by-wire Common Avionics Architecture System, Composite Tailcone and Driveshafts and Full-Authority Digital Engine Control. In-process review (IPR) cut-in decision for these upgrades will occur late-FY08.

CH-47 CHINOOK

The CH-47 Chinook is a twin-turbine, tandem-rotor, heavy-lift transport helicopter with a useful load of up to 25,000 lbs Secondary missions include MEDEVAC, aircraft recovery, parachute drops, disaster relief, and search and rescue operations. These aircraft are the Army's only heavy-lift aircraft and are fielded to heavy helicopter companies and Special Operations Forces aviation.

Key modifications integrate a new-machined airframe, an upgraded T55-GA-714A engine to restore performance capability, Common Avionics Architecture System (CAAS), Air Warrior, Common Missile Warning System, enhanced air transportability, Digital Automatic Flight Control System, and an Extended Range Fuel System II for self-deployment missions. The CH-47F recapitalization program provides a more reliable, less costly way to operate aircraft compatible with Joint digital connectivity requirements in the Future Force with an extended life of approximately 20 years. The CH-47F is expected to remain the Army's heavy-lift helicopter until at least 2020-2025.

A total of 452 CH-47F model aircraft are planned for delivery to the Army over the next 12 years. Of these, 119 will be new builds and the remaining 333 "remanufactured" aircraft. The remanufactured aircraft have 97 items that are recapitalized from a retired CH-47D. These components range from rotor heads and rotor blades to landing gear and electronics. With the exception of these items, all other components, including airframes, wiring bundles and hydraulic systems on the remanufactured CH-47Fs are new.

Program Status. The Army received its first fully equipped CH-47F in November 2006. The CH-47F Chinook Transportable Flight Proficiency Simulator was developed to train pilots to operate the CH-47F CAAS equipped aircraft and was delivered to Fort Campbell, Ky., in 2006. The first aircrew completed flight simulator training in January 2007. FUE will be completed July 2007. Subsequent CH-47F units will be fielded at a rate of two units per year.

FIXED-WING (FW)

The FW modernization strategy addresses an aging fleet of 292 aircraft of 21 different models by procuring an Aerial Common Sensor (ACS), Joint Cargo Aircraft (75 aircraft), and a Future Utility Aircraft. Decisions on the movement, retirement and reorganization of the fixed-wing fleet will be based on the FW Operational and Organizational Plan. The approved FW O&O Plan addresses Table of Distribution and Allowances to Modified Table of Organization and Equipment reorganization; composition of the FW fleet; and required capabilities for FW aircraft in the Future Force.

The Army will retain the existing FW Force Structure, given recent agreements with the U.S. Air Force on the Joint Cargo Aircraft (JCA), and in anticipation of the outcome of the Presidential Decision Memorandum (PDM) II OSA Study, the PDM III FCA/LCA Study and the Joint JCA Analysis of Alternatives. Army senior leadership will review and adjust the final transformation of the FW fleet at the conclusion of these studies and the realization of JCA as a program of record. Acquisition of JCA and FUA will be executed in accordance with the Acquisition Decision Memorandums. ACS contract termination has delayed Special Electronic Mission Aircraft (SEMA) (ACS) transformation for up to six years which requires recapitalization efforts for current SEMA RC-12 programs in order to mitigate ISR gaps until the future fielding of ACS.

HELLFIRE (HF) FAMILY OF MISSILES

HF air-to-ground missiles destroy armored and high-value point targets. Semi-active laser HF tracks laser energy delivered by ground or airborne designators, while Longbow HF uses internal millimeter wave radar frequency for autonomous guidance. AH-64 Apache, ARH, ER/MP and OH-58D Kiowa Warrior use HF as their primary air-to-ground weapon.

Program Status. The P+ Hellfire missile is scheduled for production in sufficient quantities to support the fielding of the ER/MP UAV from

FY09-13. Additional procurements will be addressed in the FY09-13 POM.

UNMANNED AIRCRAFT SYSTEMS (UAS)

In Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF), UAS such Raven, Shadow 200, Hunter and Improved GNAT are providing a new dimension to maneuver forces. Raven enhances small-unit reconnaissance, surveillance, and target acquisition (RSTA), and is used for training by deploying units. The Army's first Tactical Unmanned Aircraft System (TUAS) to go FRP is the Shadow 200, which is fielded to military intelligence companies within maneuver brigades. Planned system improvements include engine and airframe upgrades, refined target location error, Tactical Common Data Link (TCDL) and addition of a laser designation into the payload gimble.

Hunter UAS is fielded within the aerial exploitation battalions of III, V and XVIII corps. Hunter is a RSTA and battle-damage assessment (BDA) asset providing ground forces with near real-time imagery via electro-optical/infrared intelligence at ranges up to 200km. Used extensively as an ISR platform, Hunter UAS has been upgraded to employ Viper Strike munitions; its capability will be sustained until the ER/MP UAS is fielded at the division level as a RSTA, target attack and command, control, communications and intelligence (C3I) system.

The Future Combat Force will include an integrated family of UAS that provides support from the platoon to the division/corps. The FCS classes of UAS will be fully integrated elements of the organic ISR capabilities. The FCS Class I UAS will provide squad leader through company commander the capability to see over the next terrain feature. The FCS Class IV UAS will serve as the FCS Brigade Combat Team's (BCT) ISR workhorse to facilitate situational awareness, battle command, targeting support, lethal engagement, BDA, and force protection.

EXTENDED RANGE/MULTI-PURPOSE (ER/MP) UNMANNED AIRCRAFT SYSTEM (UAS)

ER/MP is a system that takes into account the entire DOTMLPF solution to conduct continuous operations against moving and stationary targets. The ER/MP system is comprised of 12 multi-role air vehicles (six with SATCOM), five ground control stations, two portable ground control stations, five TCDLs ground data terminals, two TCDL portable ground data terminals, one SATCOM system, four automatic takeoff and landing systems, 12 electro-optic/infrared, and 12 synthetic aperture radars/moving target indicators.

ER/MP UAS provides division-level and above commanders dedicated mission-configured UAS support to battlefield surveillance brigades (BFSB) and fires brigades, and tactical commanders a real-time responsive capability to conduct an array of missions to include reconnaissance, surveillance and target acquisition, C2, communications relay, signals intelligence, and BDA capability. ER/MP

equates to a company-size organization and is planned to be fielded as a separate company organic to the combat aviation brigade.

Program Status. ER/MP received Milestone B approval in April 2005. Source selection and awarding of the SDD contract was completed in August 2005. FUE for ER/MP is planned for FY09 with IOC planned for FY10. Ten companies are planned.

SMALL UNMANNED AIRCRAFT SYSTEM (SUAS)

SUAS is rucksack-portable and consists of five basic components: ground control station (GCS), remote video terminal (RVT), air vehicle (AV) (three per system), payload and field repair kit (FRP). SUAS provides company- to brigade-level commanders a greater ability to shape over-the-hill operations with dedicated unmanned aerial vehicles.

With a wingspan of 4.5 ft., and a weight of 4.2 lbs, the hand-launched, battery-powered AV provides aerial observation, day or night, at line-of-sight ranges up to 10km and delivers color or infrared imagery in real time to the GCS and RVT. Flight duration of 90 minutes is possible with organic rechargeable lithium batteries. Assembly, preflight and launch are accomplished in less than five minutes. Hand-launch and auto-land recovery are made in a small area without a prepared site or auxiliary equipment. Both one-man and two-man operations are possible.

Program Status. FUE occurred August 2006. On 5 October 2006, the Milestone Decision Authority (MDA) authorized the SUAS program to enter FRP and exercise options in the SUAS contract for FY07 and beyond to procure the quantity of systems identified in the SUAS Acquisition Plan.

Aircraft Survivability Equipment (ASE). The Suite of Integrated Infrared Countermeasures (SIIRCM) will provide an enhanced IR countermeasure capability for aviation rotary and FW platforms. A component of the SIIRCM is the Common Missile Warning System (CMWS), with an Improved

Countermeasure Munitions Dispenser (ICMD) system with advanced flare countermeasure munitions. The CMWS/ICMD recently has been installed on all deployed rotary wing and limited types of FW aircraft platforms. Efforts now will be directed to installing A/B kits on unit aircraft prior to scheduled deployment with follow on rotations and on aircraft undergoing recapitalization. Efforts continue in the development and acquisition of a multi-band, solid-state LASER (directed energy) jam head, capable of defeating all known infrared missile threats. The LASER jam head is the last component necessary to complete a full-up SIIRCM system. The Army's RF-guided missile protection program will employ the same modularized acquisition strategy as the infrared program; initially fielding an improved Radar Warning Receiver followed by a proposed RF jammer. The Army also plans to upgrade LASER warning devices (AN/AVR-2 series) across the fleet. In June 2006, G-3's Aviation Task Force, validated requirements that endorse placing ASE system A-kits on all Army aircraft platforms while providing system B-kits for all tactical aircraft. Additional procurement for

the current aircraft fleet will be considered in the FY09/13 program planning process.

Aviation Electronics (Avionics). Avionics programs ensure aviation platforms meet combined arms and Joint requirements for C2, mission planning, communications, navigation (to include worldwide civil airspace), surveillance, and information interchange, and interoperability. Major avionics initiatives include the future fielding of the Joint Tactical Radio System (JTRS) in modernized aviation platforms. Delays in JTRS have necessitated the procurement of an interim radio suite known as Alternate Communications, which provides significant increases in capabilities to include data exchange and SATCOM. Other advancements in avionics include migration of the Aviation Mission Planning Systems (AMPS) to a Joint Mission Planning System (JMPS), which will provide significant increases in mission-planning capabilities including an enhanced mission-rehearsal capability; upgrades to the Improved Data Modem as the centerpiece to digitization; GPS equipment for improved navigation accuracy; GATM equipment mandated when flying in civil airspace; and development of the Joint Precision Approach and Landing Systems (JPALS), which provides a Joint common instrument approach system for fixed base, tactical field sites and shipboard procedures.

Air Traffic Services/Army Airspace Command and Control (ATS/A2C2). ATS provide the full range of air traffic services supporting disaster relief, peacekeeping missions, homeland security, and military operations from contingency operations through major combat operations. ATS remains the Army's core enabler for Joint, Interagency and Multi-national airspace C2, ensuring synchronized access into diverse and the increasingly congested airspace systems. ATS modernization fields smaller, lighter, more efficient, more robust, digitally connected terminal and en route communications, tracking and precision navigation systems for tactical and fixed-base operations. Major programs include the Tactical Airspace Integration System, the Air Traffic Navigation, Integration, and Coordination System, Mobile Tower System, and JPALS; plus a variety of fixed equipment at locations throughout CONUS, Korea, Europe, the Balkans, Honduras, Iraq, and Kuwait.

Aviation Ground Support Equipment (AGSE). The goal of AGSE modernization is to reduce logistical support requirements by pursuing common ground-support equipment that is mission configurable, enabling flexible capabilities while improving aircraft operational readiness. Initiatives focus on improved automation, modularity, sustainability and integration of seamless logistics management through automation systems; and replacement of aging ground support equipment. Specific improvements include a new towing tractor, a life extension program for the Aviation Ground Power unit and recognition that AGSE is fielded based on G-3 GWOT priorities.

Aircraft Component Improvement Program (ACIP). ACIP sustains engineering efforts to investigate, identify, and address user identified safety and reliability related deficiencies. ACIP inserts emerging technology, extends service life, drives down O&S costs and improves readiness by keeping components operationally ready longer. ACIP also reduces Safety Risk Assessments thereby improving aircraft safety; reduces maintenance, inspections, and spare parts procurement.

Training Aids, Devices, Simulators and Simulations (TADSS). Aviation TADSS will leverage technology to provide effective and affordable combined arms/Joint training and mission planning and rehearsal simulators that are current with the aircraft/systems they replicate. Major initiatives include simulator concurrency, fidelity, and combined arms tactical and mission rehearsal simulators/simulations that network virtual, constructive and live simulation systems.

GROUND FORCE CAPABILITIES

The ground force's dominant maneuver and organic high-volume precision fires coupled with other Joint precision fire capabilities for the close fight, will overwhelm the adversary, compelling

him to flee his sanctuary or face battle to avoid defeat in detail. In either case, enemy dislocation, disintegration and destruction are inevitable through the combination of maneuver and fires enabled by ground force organic and Joint ISR, and precision engagement capabilities.

The Soldier functions as sensor, decision-maker, shooter, and assessor by observing and processing information. To assist the Soldier, the Army is fielding tactical handheld devices to quick reaction forces, combat patrols, and tactical human intelligence teams. The tactical handheld device provides Blue Force Tracking (BFT); video, Voice over Internet Protocol (VoIP) and tactical reporting capabilities via wireless networks. The tactical handheld devices have pick lists for ease of use, a "panic button" to send an emergency alert message and local and remote destroy (zeroize) capability. Tactical handheld devices allow the Soldier to send reports directly into the Joint Intelligence Operations Capability–Iraq (JIOC-I) providing actionable intelligence directly to Corps and its subordinates. This will enable quicker response times to tactical intelligence and a greater ability to track trends and identify potential threats.

SOLDIER MODERNIZATION

The Army is transforming the way it equips Soldiers. Program Executive Office (PEO) Soldier develops and fields individual clothing and equipment, sensors and lasers, small arms and integrated Soldier systems. Each of these product lines is reliant on a healthy Army research and development investment strategy to ensure that the Soldier continues to enjoy combat overmatch in the battlespace of today and tomorrow.

Shaping the Soldier of tomorrow is the Army's Soldier as a System (SaaS) concept through which the Army is working to take a more modular to equipping individual Soldiers. This vision calls for a more integrated and synchronized Soldier system requirements management structure to oversee Soldier systems life-cycle management responsibilities across the Army's capabilities needs, acquisition management, and resource allocation processes. At the tactical level, supporting Soldier processes include the Soldier Enhancement Program, Rapid Fielding Initiative, and Rapid Equipping Force.

Soldier Enhancement Program (SEP). SEP is an ongoing (since 1989), congressionally sponsored program that uses its funding resources to improve, develop, miniaturize, test, or evaluate equipment for military qualification using existing or COTS NDI or offshore sources. If no available sources of improved equipment exists, the SEP Integrated Process Team initiates appropriate development efforts, three years or less, using the most advanced and affordable technology. These developments or evaluations are used to modernize, integrate and enhance a Soldier's situational awareness, lethality, survivability, mobility, C2, and sustainability through accelerated acquisition of lighter, more lethal weapons and improved individual Soldier items.

Rapid Fielding Initiative (RFI). The Army employs RFI to leverage COTS technology and current SEP/clothing and individual equipment programs such as enhanced optics, weapon rails, target locators and communications; force protection/mobility

(includes advanced combat helmet, knee and elbow pads, military operations in urban terrain kit); and Soldier mission essential equipment (includes enhanced clothing items, hydration system and modular sleeping system).

Rapid Equipping Force (REF). REF is an operational activity that provides combat commanders with rapid, cutting-edge solutions that increase lethality, improve force protection and enhance survivability. REF takes operational guidance from the Army G-3, reports to the Vice Chief of Staff Army, and works directly with operational commanders to find solutions to identified equipping requirements. These solutions may result in procurement of new or existing military/commercial materiel equipment, or accelerated development of a Future Force materiel solution for insertion into the current force now.

REF adaptive practices are at the forefront of Army modernization and serve as a catalyst and change agent for Army transformation. REF accomplishes its mission by working in partnership with industry, academia, Army senior leaders, the Army Training and Doctrine Command, the Army acquisition community, and the Army Test and Evaluation Command to meet immediate warfighter needs.

REF technologies save Soldiers' lives. REF researches, develops and equips forces in-theater with counter-improvised explosive device (IED) material solutions, and includes solutions such as the Packbot and Marcbot robots; personnel and vehicle scanning systems; persistent surveillance systems; digital translators for Soldiers to communicate with locals in their own language; and explosive material detectors.

DISCUSSION OF KEY SOLDIER MODERNIZATION PROGRAMS

SOLDIER AS A SYSTEM (SAAS)

The SaaS concept began when TRADOC submitted a SaaS Mission Need Statement (MNS) in August 2002. This MNS served three purposes. First, it established a formal Army process to address and integrate all Soldier capabilities and needs; second, it identified the need to establish a Soldier modernization strategy that would manage the SaaS; and third, it identified capabilities required of all Soldiers to perform individual and collective tasks. The Army Requirements Oversight Committee (AROC) approved the SaaS MNS in October 2002l; TRADOC subsequently chartered the SaaS Integrated Concept Team and assigned proponent lead to the U.S. Army Infantry Center.

SaaS improves Soldier capabilities by optimizing efforts across the DOTMLPF by addressing the need to improve Soldier-machine interfaces to enhance the performance of present and future combat platforms. SaaS utilizes a DOTMLPF capability development assessment of lethality, survivability, mobility, sustainability, and battle command and situational awareness in terms of performance, power, weight, volume, cost, training and criticality of need. These are the metrics to provide Soldiers with solutions that meet their needs within the boundaries and norms of common human performance and that provide a fully integrated SaaS approach to increase the capabilities of all Soldiers to perform individual and collective tasks.

GROUND SOLDIER SYSTEM (GSS)

Ground Soldier System is an integrated, modular, dismounted fighting system that integrates the Soldier into the FCS digital network to improve their leader's situational awareness and battle command and a Soldier's lethality and survivability. GSS improves upon land warrior capabilities by connecting the Soldier to the FCS network. GSS Capabilities Production Document describes the following items that provide all Soldiers with a basic level of capability:

- Helmet subsystem with color helmet-mounted display and audio headset and microphone providing small unit COP and collaborative situational awareness
- Weapon subsystem with daylight video sight and multifunctional laser with digital compass

- Communication, navigation and computer subsystems
- Soldier control unit
- Enhancements to protective clothing and individual equipment
- Embedded Training
- Reduced weight, longer sustained power, greater reliability

The systems approach optimizes and integrates these capabilities, to include interface with the Army Tactical Internet, while reducing the logistical footprint. S&T advances in warfighting concepts, system-of-systems (SoS) architectures, and technology components in areas such as enhanced navigation, system voice control, weight reduction, digital connectivity and power are being pursued through the Future Force Warrior (FFW) Advanced Technology Demonstration (ATD), and will be inserted over time as the technology matures into the GSS. The FFW ATD also is charged with developing an analysis-of-variants system design concept that will enable expansion of the FFW concept to the other Soldier variants. This concept will contain design hooks and interfaces common to all Soldiers, providing a tailorable and reconfigurable SoS design extensible to all Soldiers.

Program Status. The program has been restructured to accommodate redefined Current Force requirements. The Army will provide enhanced situational awareness battle command, and lethality capability to small, tactical units in the near term. The Army is testing ensemble variants as potential solutions. In FY06, the Army equipped a Stryker Brigade Combat Team (SBCT) with Land Warrior II (440 systems) and Mounted Warrior (147 systems) to conduct a DOTMLPF assessment. Initial operational capability will be achieved with completion of the Army's RFI program in FY07. In the far-term, the program is focused on GSS development. GSS is scheduling a milestone B decision in first quarter FY08.

AIR WARRIOR (AW)

Air Warrior is a Soldier system for helicopter crewmen that provides a new generation of integrated, mission-tailorable, combat-effective life support equipment and chemical/biological protection with reduced weight/bulk designed to improve aircrew endurance, mobility and performance. AW significantly improves flight time in Mission Oriented Protective Posture (MOPP) 4 from 1.6 to 5.3 hours. AW systems/components include:

- Microclimate cooling system that includes a microclimate cooling garment (MCG) and a small microclimate cooling unit that chills water and pumps it through small tubes embedded in the MCG
- Survival equipment subsystem that includes a survival gear carrier, soft and hard body armor, thigh holster, and survival knife
- Interim Modular Integrated Helmet Display System (MIHDS) with laser eye-protection and a night-vision device mount

- Over-water survival subsystem that includes a personal flotation device, survival egress air (breathing oxygen), and an inflatable raft (LRU-18U) that is integrated into the ensemble and worn by the crew member
- Nuclear, biological and chemical protection with modified chemical protective undergarment, M45 or M48 protective mask with blower unit, gloves and overboots
- Aviation clothing items that include modified aircrew battle dress uniform (BDU) and the Aircrew Cold Weather Garment System

Future AW system spiral development improvements focus on the technology insertion of improved and/or enhanced components reflecting emerging technologies defined in AW Blocks 2 and 3.

Block 2 developmental efforts are underway and will add an Aircraft Wireless Intercom System (AWIS) and the Electronic Data Manager (EDM). AWIS will enhance crew member performance by providing the capability for wireless communications within the aircrew and with ground crew or ramp support personnel such as in a tactical forward area rearm and refueling point (FARRP). The EDM, in the form of a digital kneeboard, provides a capability to the aircrew to generate, store, display and distribute digital information and will interface with BFT systems.

Block 3 efforts will increase performance and capabilities by adding a fully compliant MIHDS helmet. The MIHDS helmet will provide, as a baseline, the same safety performance characteristics as the HGU-56/P helmet (impact, sound attenuation, retention, etc.). The MIHDS will be tailorable and compatible with the Apache helmet-configuration and head tracking technologies and will also provide an improved day/night helmet-mounted display symbology for those aircraft that currently lack this feature. These helmet-mounted displays will be compatible with aircrew prescription spectacles, CB protection, oxygen masks, laser eye protection and nuclear flash protection technologies. CB protection will be donned in-flight without removing the helmet.

Program Status. Air Warrior currently is being fielded to the force based on the March 2004 Joint Requirements Oversight Council approved Operational Requirements Document. Approximately 68 percent of AW Block I equipment has been issued. Block I includes Body Armor, Survival Gear Carrier, Microclimate Cooling Garment, Protective Mask Blower, Holster, Knife, Over water Equipment, Survival Egress Air, Flotation Collar and Modified Aviation Battle Dress Uniform. Block II included the Electronic Data Manager (knee board) and the Aircraft Wireless Intercom System. The Air Warrior program manager (PM) has fielded 46 percent of AW ensembles and has awarded a contract for a secure capability for the AWIS. Expect fielding FY '10.

MOUNTED SOLDIER SYSTEM (MSS)

Mounted Soldier System provides dismounted and mounted combat crews uninterrupted viewing of their immediate surroundings while remaining connected to onboard platform command, control, communications, computers and intelligence capabilities, thereby providing crews with continuous situational awareness and communications with platform and dismounted Soldiers. MSS also will provide maximum individual protection from Chemical/Biological contamination without reducing individual dexterity, tactility, agility and mobility. The MSS ensemble includes a helmet subsystem (advance combat helmet, head-mounted display for vehicle commanders, and improved audio headset and

microphone); cordless communications; protective clothing/individual equipment subsystem (crew member over garments; gloves; footwear; ballistic protection; protective mask and over garments and ballistic/laser, sun, wind and dust eye protection).

Program Status. The Army procured 147 MSS (Increment I) in FY06 for a Land/Mounted Warrior Stryker Interoperable Assessment. Mounted Warrior Soldier System (MWSS) CPD also provided the Increment I capability used to refine Tactics Techniques and Procedures (TTPs) during the Land/Mounted Warrior Stryker Interoperable Assessment in FY06. MSS will be developed in two increments. AROC approved CDD on 24 March 2006, with Joint Staff J-2 and J-6 certifications completed on 5 December 2006. MSS Increment II Milestone Decision B will occur in FY08.

EOD FAMILY OF SYSTEMS

Lessons learned from OEF and OIF have increased the awareness and priority of EOD systems. The EOD family of systems provide Soldiers at home and abroad the capability to remotely examine, identify and render safe ordnance and IEDs. Production of the MTRS began in September 2005; future acquisitions will include the Sub-munitions Clearance System (SCS) and the Medium Directional Energy Tool (MDET) of the Large IED Countermeasures Family of Systems. MTRS and SCS are modified commercial acquisitions. MDET will be commercially produced from a government-developed drawing package and specification. SCS and MDET are new critical capabilities; MTRS provides an improved capability.

COMBAT IDENTIFICATION (CID)

CID measures enhance Soldier protection and overall combat effectiveness by minimizing fratricide incidents. As a result of lessons learned In OEF and OIF, the Army has fielded thousands of the Joint CID Marking System (JCIMS) kits to its forces and plans to continue fielding these devices to new force rotations deploying to these theaters. The JCIMS kit consists of thermal and infrared marking devices that enable forces equipped with FLIR and night-vision sensors to identify friendly forces based on the unique signatures of the JCIMS devices. Combined with the increasing density of GPS systems, BFT systems, FBCB2, and Second Generation FLIR technology, these devices on the battlefield have significantly reduced fratricide incidents through an improved ability to locate and identify friendly forces on the battlefield.

An interactive vehicle recognition training device called Recognition of Combat Vehicles (ROC-V) is being issued to Soldiers at every level, and can be easily downloaded because it comes on a computer disc. Army Combat Training Centers (CTC) have put in place measures to assess CID and Situational Awareness during unit rotations, and an aggressive program for capturing, reconciling, and leveraging lessons learned from OIF, OEF, and CTCs to improve TTP, training, and doctrine, and CID is a major focus area at the Center for Army Lessons Learned.

Program Status. In March 2004, the Army and Marine Corps Board (AMCB), co-chaired by Army G-8 and the U.S. Marine Corps Assistant Deputy Commandant, Programs & Resources, conducted a review of CID efforts in the Army and Marine Corps and directed that a DOTMLPF-based study be conducted to develop recommendations of banded investment strategies for AMCB consideration.

The AMCB reviewed the CID study results in August 2004 and approved investment recommendations for CID that included the resourcing of low-cost/high payoff improvements in DOTMLPF, equipping of 800 Abrams tanks with Second Generation FLIR, and continued procurement of the JCIMS–thermal and IR marking devices—"Go-to-War" requirements in support of USCENTCOM.

The AMCB also agreed to support the ongoing Coalition Combat Identification Advanced Concept Technology Demonstration (CCID ACTD) S&T effort and to defer any decision on a CID technology until completion. This U.S-led multinational effort is designed to evaluate the military's utility of advanced technologies to improve CID, minimize fratricide incidents, and provide increased combat effectiveness in Joint, Allied, and Coalition nations.

The following candidate technologies were evaluated in the CCID ACTD: Battlefield Target Identification Device (BTID), which consists of Millimeter Wave Interrogator, Millimeter Wave Transponder and Communication-Electronics Unit.

Radio Based Combat ID (RBCI)—Consists of software modification to SINCGARS ASIP which enables shooters to interrogate area of interest and receive replies from friends.

Optical Combat ID System (O-CIDS)—Consists of a laser interrogator and optical retro-reflector transponder; RF Tags; and JCIMS.

BTID with Digital Data Link (DDL), which demonstrated the potential to reduce fratricide as well as enhancing combat effectiveness, allowing networked vehicle platforms to exchange situational awareness digital data without overloading voice communication networks and operates within the secure BTID millimeter-wave Ka-band.

JCIMS remains a reliable means to reduce fratricide. However, Opposing Forces' ability to use their FLIR and IR assets to detect JCIMS must be considered. Based on the CCID ACTD results, the AMCB approved BTID and RBCI to compete for funding in the FY08-13 POM and consideration for transition to formal acquisition programs of record.

THERMAL WEAPON SIGHTS (TWS)

TWS are a family of low-cost, lightweight, man-portable IR imaging devices used for surveillance and fire control of individual and crew served weapons during daylight and darkness, adverse weather, and dirty battlefield scenarios. They can also penetrate including light foliage, smoke, dust and camouflage. Uncooled microbolometer technology has evolved to enable the development of advanced TWS II systems. TWS II systems offer increased performance in a smaller, lighter package and employ the use of standard commercial batteries.

Program Status. The TWS program is in sustainment, having fielded more than 23,000 light, medium, and heavy systems. TWS II system hand-off to deploying units began in third quarter, FY06.

ENHANCED NIGHT VISION GOGGLES (ENVG)

The next generation of night-vision goggles for the Soldier is the ENVG. It combines both an uncooled thermal and an image-intensification (I2) capability into a single integrated device. ENVG improves Soldier Situational Awareness by providing the capability to rapidly detect and recognize man-sized targets, while simultaneously maintaining the ability to see detail and to use rifle-mounted aiming lights. The ENVG provides Soldiers the ability to engage and execute close combat in all levels of light, to include the zero-illumination conditions found in caves and underground environments, adverse weather conditions and under battlefield obscurant conditions. This is a system component of the Soldier Warrior programs.

Program Status. The ENVG currently is in developmental testing with system reliability tests with Soldiers having been schedule for early 2007. Contractor pre-qualification testing will be conducted during second quarter FY07. Government developmental tests and an operational test are scheduled for second and third quarters, FY07 with a Milestone C decision to follow in first quarter, FY08.

COUNTER-DEFILADE WEAPONS AND IMPROVED AMMUNITION

New and advanced technologies will enable development and fielding of precision high-explosive airburst munitions systems; lighter weight and improved ammunitions; non-lethal munitions; embedded training simulators; lighter-weight direct-view sights; improved multifunctional lasers; micro electro-mechanical systems; improved ordnance such as, nano-explosives, maneuverable projectiles, and advanced shaped-charge designs; and developing fusing technologies and improved materials that will increase operational effectiveness and reduce total life-cycle costs.

Program Status. Objective Individual Combat Weapon (OICW) Increment I funding has been reprogrammed into acquisition and modernization

of existing weapons. OICW Increment II and III initiatives have been returned to the technology base for further development.

M2 HEAVY BARREL (HB) (ENHANCED) .50 CALIBER MACHINE GUN (M2E2)

The M2 HB (Enhanced) .50 caliber Machine Gun (M2E2) offers the Soldier proven performance and in-place logistics support of the existing M2HB machine gun, together with improvements such as a fused headspace and timing configuration, the quick-change barrel (QCB) system, and manual safety that make it easier and safer to use. The flash hider reduces muzzle flash, making the M2 night-vision friendly. A patented, three-slot barrel retention system ensures secure barrel locking and alignment. These upgrades can be fitted to existing M2HB weapons.

Program Status. Materiel solution is in development. Selected components, including the trigger block (safety) to be procured and fielded beginning third quarter FY07.

XM101 COMMON REMOTELY OPERATED WEAPON STATION (CROWS)

The XM101 CROWS is a vehicle-mounted weapon station that enables under-armor/remote operation of weapons. CROWS is a two-axis stabilized mount that contains a sensor suite and fire control software, allowing on-the-move target acquisition and first-burst target engagement. CROWS is designed to mount on a variety of

vehicle platforms and supports the MK19 Grenade Machine Gun, .50 Caliber M2 Machine Gun, M240B Machine Gun, and M249 Squad Automatic Weapon (SAW). It increases engagement range, first-round hit probability, and operational response time. The CROWS sensor suite includes a daytime video camera, second-generation FLIR, and laser rangefinder, enabling target engagement under day and night conditions. CROWS allows the Soldier to view a target independent of gun elevation. Its manual/emergency backup operation capability offers improved firing stability over the current pintle mount. More than 200 systems have been fielded in support of GWOT and have saved numerous lives from IEDs and sniper fire.

CROWS-Lighting also is a vehicle-mounted weapon station that enables under-armor/remote operation. CROWS-Lightning uses the M240B Medium Machine Gun, the M249 SAW, and XM307 Advanced Crew Served Weapon. Based on the CROWS concept, CROWS-Lightning provides performance characteristics similar to CROWS: increased engagement range, increased first-round hit probability, and increased operational response time on a variety of vehicles incapable of mounting the MK19 Grenade Machine Gun or the M2 .50 Caliber Machine Gun due to vehicular weight limitations. The CROWS-Lightning program is being executed in conjunction with the REF.

Program Status. CROWS are currently being procured and fielded to meet theater ONS. Upon satisfaction of all theater ONSs, fielding to the Army will begin.

XM110 7.62MM SEMI-AUTOMATIC SNIPER SYSTEM (SASS)

The selected replacement for the M24 Sniper Weapons System, the XM110 7.62mm SASS is effective against personnel and light materiel targets. Capable of rapid fire/rapid reload, this suppressed sniper rifle exceeds the rate-of-fire and lethality of the M24 Sniper Weapon System. SASS is lighter than the M24 and its anti-personnel ranges are equal to or greater than M24. SASS includes an enhanced sniper spotting scope, a detachable suppressor, a carrying case, and other support equipment.

Program Status. The XM110 currently is awaiting Milestone C before proceeding with the production contract award currently scheduled for the third quarter FY07.

XM 150 RIFLE COMBAT OPTIC (RCO)

The XM 150 RCO will improve the capability to recognize and engage targets from zero to 600 meters with the M4 carbine, M16 Rifle, and the M249 SAW. The optic will allow Soldiers to rapidly transition between long-and close-quarter engagements without degrading the ability to conduct reflexive fire techniques. The optic can be used to scan an area for acquiring and engaging targets. When a target is acquired, the ranging reticle within the optic can be used to obtain an accurate range to the target. An appropriate aiming point on the reticle can then be selected to accurately engage the target.

Program Status. The RCO has an approved CPD. The sight is currently being fielded via RFI to units directly involved in the GWOT. Approximately 21,000 RCOs are in use in Iraq and Afghanistan at this time.

XM26 12 GAUGE MODULAR ACCESSORY SHOTGUN SYSTEM (MASS)

The XM26 12 Gauge MASS attaches underneath the barrel of the M4 Modular Weapon Systems and fires lethal and non-lethal 12-gauge rounds, as well

as door breaching ammunition. MASS provides a capability to transition between lethal and non-lethal rounds and can serve as a stand-alone shotgun. MASS will eliminate the current practice of carrying a second weapon for door-breeching operations.

Program Status. MASS is undergoing testing, and if successful, will be introduced into the Force in FY07-08.

XM320 GRENADE LAUNCHER MODULE (GLM)

The 40mm XM320 GLM will replace the M203 series grenade launchers currently mounted on the M16/M4 series of rifles and carbines. The XM320 is intended to be lighter, safer, and more reliable than current man-portable grenade launching systems and will provide improved lethality by providing a day/night firing capability out to the maximum effective range of current ammunition. It also is designed to offer an open architecture attachment system for mounting on M16A2, M16A4, and M4 rifles and carbines. XM320 fires in a stand-alone mode, with an attached shoulder butt stock, and provides a safer, more reliable trigger/firing system, compared to the M203. The weapon will have an unrestricted breach access to allow the use of longer ammunition than currently fielded.

Program Status. The GLM is undergoing testing and will be introduced into the force by FY08.

LIGHTWEIGHT LASER DESIGNATOR RANGE FINDER (LLDR)

The LLDR is a man-portable, modular, target location and laser designation system. The system consists of a target locator module and a laser designator module. LLDR provides Soldiers a man-portable capability to observe and accurately locate targets, digitally transmit target location data to the tactical network, and laser-designate high-priority targets for destruction by precision munitions. LLDR greatly increases the ability to recognize targets at night and under battlefield conditions. Production and fielding of the LLDR will also allow the Army to divest the older Ground/Vehicular Laser Locator Designator (G/VLLD) from its inventory. Using first-generation FLIR technology, the G/VLLD system is not as capable and weighs almost three times that of an LLDR, and is becoming more difficult and expensive to maintain as each year passes.

Program Status. LLDR is currently in FRP, but the Army's total requirement, at current funding levels, will not be procured until FY16. In the interim, the Army will field the systems to BCTs at less-than-full authorization to ensure that all units have some capability. The Army continues to seek improvements in system range and overall weight reduction.

NON-LETHAL CAPABILITIES SETS (NLCS)

The shifting military environment is likely to see greater mixing of enemy combatants with noncombatants and there are likely to be situations where deadly force is undesirable. Non-lethal capabilities are a family of systems that employ means other than gross physical destruction to prevent, disrupt, incapacitate, disable, neutralize or impede the target from functioning while minimizing unintended casualties and collateral damage. These include weapons commonly referred to as non-kinetic, less-than-lethal and/or low collateral damage weapons. The NLCS can be deployed rapidly by military transport or commercial carrier. NLCS consists of six categories: counter personnel systems, counter materiel systems, protective equipment, enhancement devices, training devices/allocations and support equipment.

Program Status. NLCS is being fielded to units supporting and preparing to support OIF/OEF. The initial fielding of 96 sets was delivered in summer 2005, with additional sets being procured during the FY06-11 program plan cycle.

GROUND FORCE MODERNIZATION

The Future Combat Force Strategy is aimed at the development and initial fielding of a maneuver

brigade equipped with FCS to bring future modular force capabilities into the current force. The Unit Set Fielding (USF) process will field these units with capabilities achieved from a complete set of unit equipment. Under the SoS approach, the unit must demonstrate the ability to operate interdependent systems together to achieve an IOC for the unit. In FY03, the first SBCT completed fielding and operational testing to achieve IOC. Since then, both the second and third SBCTs have also been fielded and deployed for operational missions in Iraq. The BCT will serve as the base unit for the spin-out fielding that will accelerate FCS technologies into the force.

STRYKER BRIGADE COMBAT TEAM (SBCT)

The SBCT is inherently a precision unit. The force design of the SBCT provides the Army with dominant maneuver and precision engagement capabilities not found in any other Army brigade-sized unit. Specifically, the RSTA squadron, equipped with unmanned aerial vehicles (UAVs) and ground-based HUMINT specialists, provide the commander with unequalled situational understanding. The networked C2 architecture allows the commander to provide the same picture to lower echelons and major combat platforms, such as the Stryker vehicle, thereby establishing a real-time friendly force operational picture for the unit. The SBCT also features organic, ground-based sniper teams—the essence of precision strike and a critical combat requirement.

The SBCT's force application capability is truly global. C-130 transportable, the unit can deploy rapidly to austere environments, thereby overcoming enemy area-denial and anti-access efforts, and can quickly mount offensive operations with minimal reception, staging and integration. Although it excels in the midpoint of the operational spectrum, it can fight effectively as a fully committed unit in major engagement and battles with augmentation (such as attack aviation and/or rocket artillery). With its superior tactical mobility and excellent battlefield situational awareness, the SBCT can also execute difficult security missions such as guard, cover, screen, counter reconnaissance and rear-area combat operations. The superior off-road maneuverability of the Stryker vehicle, combined with its dismounted infantry assault capability featuring robust anti-tank weaponry, ensures the SBCT can very effectively engage and destroy enemy armor in close, complex and/or urban terrain.

The Army is currently benefiting from the capability of the SBCT in operational missions in Iraq. The unit is maximizing the capabilities of this transformational organization in combat operations. Examples are increased speed (60+ mph) and survivability (protection against rocket-propelled grenades (RPGs) and IEDs) provided by the Stryker family of vehicles in the brigade; near-seamless situational awareness down to the combat vehicle crew level allowing quick execution of changing missions; high rate of reliability of the Stryker vehicles; and high confidence in the vehicle and its capabilities by the Soldiers in the brigade.

FUTURE COMBAT FORCE DEVELOPMENT

The Future Combat Force is an offensive-oriented force, that conducts operational maneuver from strategic distances, executing synchronized, distributed operations as part of a Joint force to destroy key enemy capabilities in a distributed, nonlinear battlespace. It provides seamless C4ISR, FCS, integrated sensors, attack and reconnaissance helicopters, expanded maneuver and fires with standoff, LOS and NLOS capabilities. These attributes enable the Joint force to achieve total disintegration, dislocation and destruction of enemy forces from tactical through operational levels.

DISCUSSION OF KEY GROUND FORCE MATERIEL PROGRAMS

ABRAMS TANK

The Abrams tank modernization strategy comprises two variants, the M1A1 and M1A2 System Enhancement Program (SEP), and supports Army Modularity and the *Army Campaign Plan* by providing the lethality, survivability, and fightability necessary to defeat advanced threats well into the future. Abrams closes with and destroys enemy forces on the integrated battlefield using mobility, firepower, and shock effect. The 120mm main gun on the M1A1 and M1A2, combined with the powerful 1,500-horsepower AGT turbine engine and special armor, make the Abrams tank particularly effective against large concentrations of heavy armor forces on a highly lethal battlefield.

The M1A1 modernization program includes increased armor protection, suspension improvements, and an NBC protection system. An integrated appliqué computer, an embedded diagnostic system, a second-generation thermal sensor, and a far-target-designation capability can be incorporated on the M1A1.

The M1A2 modernization program includes a commander's independent thermal viewer, an improved commander's weapon station, position navigation equipment, distributed data and power architecture, embedded diagnostic system, and improved fire control system. The M1A2 (SEP) adds second-generation thermal sensors and a thermal management system. The M1A2 SEP includes upgrades to processors/memory that enable the M1A2 to use the Army's common command and control software, enabling the rapid transfer of digital situational data and overlays.

The Abrams modernization strategy also includes the total integrated revitalization (TIGER) program, an intensive AGT 1500 engine rebuild effort consisting of engine data collection, transition of parts management to the contractor, and implementation of commercial production practices of engine overhaul at Anniston Army Depot. The Abrams integrated management (AIM) overhaul program recapitalizes the high Operational Tempo of the M1A1 tank fleet. The Abrams parts obsolescence program tracks obsolete components to ensure the availability of spare parts and maintains a database of current parts to ensure that a complete package is intact for any new production.

Program Status. The Army completed fielding of M1A2 SEP tanks to the 4th Infantry and 1st Cavalry divisions. The Army continues to field rebuilt M1A1 tanks to 3rd ID and plans to field upgraded (with second generation FLIR) to 1st and 2nd ID in FY08. The remaining six Army National Guard brigades will be fielded with upgraded M1A1 tanks by FY11.

BRADLEY FIGHTING VEHICLE

The Bradley recapitalization program rebuilds and upgrades M2/M3A2s to the most modernized M2/M3A3 configuration. The A3 adds two second-generation FLIR devices (one in the commander's independent viewer and one in the improved Bradley acquisition sight), a position/navigation system, core electronic architecture, and digital C2. These upgrades improve the crew's ability to navigate, pinpoint and identify friendly and enemy positions, and engage two separate targets nearly simultaneously in both day and night conditions. Also, the digital C2 provides a near real-time integrated data link between the M2A3 and other combat vehicles and headquarters.

Program Status. The 1st Cavalry and 4th Infantry divisions are fielded with M2A3 Bradleys. The 3rd Cavalry Regiment (CR) will be fielded with recapitalized Bradley cavalry/scout vehicles by March 2007, followed by the Army Evaluation TF, and then the 1/1 Armored Division in September 2007. The Army currently is fielding Bradley ODS-E vehicles to engineer companies in Heavy Brigade Combat Teams. These digitized vehicles will vastly improve the lethality, survivability and situational awareness for the engineers and supported units.

STRYKER FAMILY OF ARMORED VEHICLES

The Stryker Family of Armored Vehicles is the centerpiece combat and combat support platform for the SBCTs. Ten configurations of the Stryker will be fielded: the Mobile Gun System (MGS) and the Infantry Carrier Vehicle (ICV). : Reconnaissance Vehicle (RV), Mortar Carrier (MC), Commander Vehicle (CV), Fire Support Vehicle (FSV), Engineer Squad Vehicle (ESV), Medical Evacuation Vehicle (MEV), Anti-tank Guided Missile Vehicle (ATGM), and Nuclear, Biological and Chemical Reconnaissance Vehicle (NBCRV). Stryker capabilities include:

- Strategically responsive and deployable on the complete U.S. Air Force family of transport aircraft, C-130 and larger
- Roll-on/roll-off combat capable with minimum preparation
- Superior situational awareness with internetted/networked communications
- Survivability enhanced by all-around 14.5mm armor piercing and 152mm artillery airburst protection (add-on armor provides protection against RPG anti-tank weapons)
- Accurate target acquisition with LRAS3 mission package
- Accurate target engagement with Remote Weapon Station (MK19 grenade launcher and/or M2 .50 caliber machine gun)
- Decisive offensive action with dismounted ICV
- Bunker-busting capability with 105mm cannon (MGS) for roles in immediate fire support of dismounted infantry operations and with tube-launched, optically tracked, wire-guided (TOW) bunker-buster munitions (ATGM)
- Responsive indirect fires with 120mm mounted mortar (MC)
- Anti-tank capability with TOW 2B (ATGM) and Javelin-equipped dismounted infantry (ICV)
- Mobility enhanced by mine plow, roller and detector (ESV)
- Integrated NBC sensor capability (NBCRV)

Stryker provides a unique family-of-systems approach that maximizes commonality and integrated capabilities while filling an immediate capabilities gap in the current force. Supporting Stryker fielding is a complete new home station equipment training package for both operators and maintainers.

Program Status. Planned procurement is for 2,745 vehicles consisting of two variants: ICV and MGS. Stryker program obtained an FRP decision on seven of the ten configurations variants in February 2004; these include ICV, RV, CV, FSV, ESV, MEV, and ATGM. The Army has funded, and the Secretary of Defense has authorized, procurement and fielding of seven SBCTs to fulfill the defense strategy and national security requirements.

M777A1 LIGHTWEIGHT 155MM HOWITZER

The Army has a requirement for an advanced, towed, lightweight 155mm howitzer, with self-locating and aiming capability, that meets increased operational thresholds for mobility, survivability, deployability and sustainability. The M777A1 lightweight 155mm howitzer is funded in the FY07-11 program plan as a weapon system that meets this requirement. A Joint USMC/Army program, the M777A1 will provide accurate, reliable, responsive, on-demand, 24-hour, all-weather and all-terrain close support fires to maneuver forces. A software upgrade is planned for FY07 which will integrate the capability to program and fire the Excalibur precision guided munitions.

Program Status. The FY07-11 program plan funds the procurement and fielding of the (M777A1) system to selected Army units, beginning with the SBCTs in FY06-08. A four-year production contract was awarded 22 March 2005. A Full Materiel Release for the M777A1 was achieved January 2007 and fielding to Army and USMC artillery units is currently underway. The first Army unit to receive the weapon was 2-11 FA (SBCT 5). Development of the upgraded software which integrates Excalibur capability is complete and it will be incorporated into the next fielding of the system which will then be designated as the M777A2.

M119A2 LIGHTWEIGHT 105MM TOWED HOWITZER

The M119A2 has been in service since 1989, and is used by the Army's light forces to fulfill direct support artillery mission within those units. Decisions to pursue modularity and convert the ARNG to a pure fleet of M119A2s (and remove the M102 from inventory) have roughly doubled the Authorized Acquisition Objective (AAO) for M119A2s to 814 systems. This requirement has driven the need to reenter production and produce 400 additional M119A2s.

Program Status. Funding to begin program and initiate production received in the FY05 and '06 Supplementals. A make/buy decision was made to produce the howitzers at Rock Island Arsenal. Using FY05/'06 Supplemental funding, long-lead materials have to be placed on order and manufacturing activities to produce the initial year's order quantity of 35 weapons have begun. The first delivery of a complete new production M119A2 is scheduled for April 2007. After production testing

is complete, materiel release is expected by the end of first quarter FY08 with fieldings commencing in second quarter FY08.

FUTURE COMBAT SYSTEMS (FCS)

The FCS BCT is designed to interact with and enhance the Army's most valuable weapon—the Soldier. When fully operational, FCS will provide the Army and the Joint force with unprecedented capability to see the enemy, engage him on our terms, and defeat him.

Program Status. FCS is in the System Development and Demonstration (SDD) phase and passed IPDR in fourth quarter FY06. To meet upcoming challenges while addressing budget constraints, the Army has directed adjustments to the current Future Combat Systems (FCS) program. These adjustments during the '08-13 POM to:

- Reduce FCS family of systems from 18 to 14
- Eliminate two classes (Class II and III) of Unmanned Aerial Vehicles (UAV)
- Put laser designation capability on CL I UAV and increases number of Class IV UAV from 24 per BCT to 32 per BCT
- Remove IMS from the FCS BCT. (Stand-alone IMS program remains intact to meet national land mine policy). IMS loss offset in operations by increasing number of Unattended Ground Sensors–Tactical from 162 to 202 per BCT
- Reduces rate of production from one-and-a-half to one FCS BCT per year
- Reduces number of NLOS-LS from 60 Controller Launch Unit to 24 with one reload per CLU per BCT
- Funds FCS unique munitions; MRM beginning in FY08 and Advanced Kinetic Energy (AKE) in FY12
- Eliminates XM-307 (Advanced Crew Served Weapon)
- Reduces WIN-T Points-of-Presence (PoP) from 136 to 101 (80 in FCS platforms)
- Changes radio mix (fewer 8-Channel JTRS radios)
- Provides MGV with network-able chemical/radiological sensors and other unmanned systems for integration and testing in accordance with the FCS developmental schedule
- Provides MGV PM with overpressure filtration system and decontamination equipment for integration to meet the MGV developmental schedule
- Slips Milestone C (MS C), FOC, and IOC up to six months (MS C=2QFY13, FOC=3QFY17, IOC=3QFY15) for FCS BCT
- Includes a network-able radiological sensor in the CBRN UGS (Spin Out One)

ARMORED SECURITY VEHICLE (ASV)

The ASV is a lightly armored all-wheel drive vehicle with 360 degree armor protection against armor-piercing, high-explosive fragmentation, and anti-tank mines under the wheels and/or under the hull. The ASV has a crew of three plus one passenger; vehicle intercom system with combat vehicle crewman (CVC) helmets. The armament suite consists of a MK19 grenade machine gun (GMG) and M2MG. It has a full collective NBC protection systems as well as a digitization package which includes FBCB2 (Blue Force Tracking) and SINCGARS radio.

The ASV provides minimum essential protection to Combat Support units in highly exposed threat environments. The primary vehicle requirement is for ballistic protection (wraparound and overhead) greater than the Up-Armored HMMWV. Increased lethality is provided via both point/area weapons (M45/MK19) in the same turret. The ability to reload under armor adds to crew survivability. The ASV survivability and lethality increase the military police capability to conduct stability operations to include convoy escort; area and route reconnaissance and surveillance; counter-incursion reaction force roles; and security of critical assets, key personnel and lines of communication.

Program Status. Currently, 1,118 ASVs are funded and 162 ASVs have been fielded to the Area of Responsibility and will continue until Theater requirement of 872 ASVs is met in May 2007.

PALADIN/FIELD ARTILLERY AMMUNITION SYSTEM VEHICLE (FAASV)

The M109A6 (Paladin) 155mm howitzer is the most technologically advanced self-propelled cannon system in the Army. FAASV provides the armored ammunition re-supply vehicle in support of the Paladin, which uses state-of-the art components to achieve dramatic improvements in:

- Survivability: "Shoot and scoot" tactics; improved ballistic and NBC protection
- Responsive fires: Capable of firing within 45 seconds from a complete stop with on-board communications, remote travel lock, and automated cannon slew capability
- Accurate fires: On-board position navigator and technical fire control
- Extended range: 30km with HE, rocket-assisted projectile and M203 propellant
- Increased reliability: Improved engine, track, and diagnostics

Program Status. Paladin Integrated Management (PIM) program will rebuild platforms, apply current Modification Work Order's, and deliver a ready, relevant, and sustainable platform. PIM objective is to obtain and maintain a fleet age of 10-12 years.

NON-LINE-OF-SIGHT CANNON (NLOS-C)

The NLOS-C is embedded in the overall FCS program architecture and one of eight manned variants. It will utilize the Modular Artillery Charge System (MACS) and inductively set fuzes, such as the M762/A1, M767/A1 and multiple-option fuze, artillery (MOFA). As the primary fire support asset available to the FCS maneuver brigade commander, it will provide sustained fires capability for both precision (Excalibur) and area fires (suppression) to forces in combat and are networked to Joint fires. Its networked capability and high rate of fire enable it to provide rapid long-range fires. System development will be integrated with the development of munitions and complementary ISR capabilities that locate, track, identify, engage and destroy all target types with effects scaled by the mission and target set.

Program Status. The Army is working to field NLOS-C starting in FY10, and will deliver eight prototype NLOS-C systems in 2008 to support the FY10 fielding. The NLOS-C will influence the MGV risk reduction efforts, early user evaluation by the AEFT and system level testing. Test firing of the NLOS-C system demonstrator continues at Yuma

Proving Ground, AZ, as well as proof of concept demonstrations for vehicle weight, and the hybrid electric drive risk reduction.

NON-LINE-OF-SIGHT LAUNCH SYSTEM (NLOS-LS)

NLOS-LS is a core FCS program that is a networked system of missile launchers with an integrated C2 system that will provide Precision Attack Missiles (PAMs). NLOS-LS will provide networked, extended-range targeting and precision attack of armored, lightly armored and other stationary and moving targets during day, night, obscured and adverse weather conditions. Its primary purpose is to provide responsive precision attack of high-payoff targets in support of the FCS maneuver brigade in concert with other FCS maneuver brigade NLOS systems as well as other Army, Joint system capabilities. PAM can provide a discriminating capability via automatic target acquisition and provides battle damage information through a snapshot of the target just before impact.

Future planned improvements include addition of low-cost, tri-mode capability to the PAM. The system has flexibility to respond to all FCS maneuver brigade sensors, SOF, and other Army, Joint, and multinational elements. The system will be capable of multimodal transport and will be fired from the ground or from manned/unmanned tactical transport vehicles. NLOS-LS consists of the container launch unit housing individual containerized munitions, PAMs, and an onboard C2 capability. The system has an external mission planning software application designed to operate on the future battle command system for planning and execution of multiple and simultaneous missions.

Program Status. The system will be fielded to the Evaluation Brigade Combat Team (EBCT) in first quarter, FY08. Program MS C and LRIP in FY09.

HIGH MOBILITY ARTILLERY ROCKET SYSTEM (HIMARS)

The M142 HIMARS provides Joint early entry forces, SOF, and BCTs with continuous highly responsive, all-weather, precision, medium- to long-range rocket and missile fires to a depth of 300km. HIMARS units are organic to modular fires brigades that provide integral fire support for BCTs. HIMARS fills the gap in range between direct-fire systems, short-range artillery systems, and longer range air systems. Mounted on a Family of Medium Tactical Vehicles (FMTV) chassis, combat-loaded HIMARS is C-130 transportable and provides full Multiple Launch Rocket System (MLRS) family of munitions (including GMLRS and ATACMS) capability, yet requires 70 percent fewer airlift resources to transport than the current M270 MLRS launchers. HIMARS Advanced Concept Technology Demonstration prototype launchers were employed successfully in OIF, providing precision fires. Firing GMLRS-Unitary precision rockets, HIMARS can support to a range of 70km with low-collateral damage enabling danger-close fires in support of friendly forces (within 200m), as well as engaging targets in urban and complex environments. Employing ATACMS Quick Reaction Unitary, HIMARS can extend low-collateral precision attack to 270km.

Program Status. HIMARS is type classified standard and is in FRP. The 3-27 Field Artillery, XVIII Airborne Corps, FUE, became fully operational during first quarter FY06. Subsequent HIMARS fieldings are ongoing to both Active and Army National Guard units.

DISCUSSION OF KEY GROUND FORCE FAMILY OF MUNITIONS

CHEMICAL ENERGY MISSILES–JAVELIN

The Javelin missile provides dismounted infantry with a medium-range, man-portable, simple-to-operate, shoulder-launched, economical, rugged and reliable anti-armor weapon system that provides a highly formidable capability able to defeat all known armor threats for the dismounted close fight. With top and direct attack modes and 2.5 times the range, Javelin is a leap-ahead improvement over the Dragon system. Javelin has two major components: a reusable Container Launch Unit (CLU), and a missile sealed in a disposable launch tube assembly. Moreover,

Javelin's CLU incorporates an integrated day/night sight and greatly improves battlefield surveillance and survivability. Javelin has fire-and-forget technology that allows the gunner to lock on to the target, fire the missile, and immediately take cover. Other features include a tandem warhead, an imaging IR seeker and a soft launch that allows the missile to be fired from enclosures. In addition to its high lethality, Javelin is ideally suited to rapid deployment due to its size, reliability and small logistics tail. Javelin was praised by combat commanders during OEF and OIF. Lessons learned from OEF/OIF operations are shaping the Javelin preplanned product improvement program.

Program Status. Javelin FUE was June 1996, with FRP beginning May 1997 and scheduled to continue through FY09. Javelin is being fielded to infantry, armor scouts and combat engineer units. The Block I program includes improvements in CLU for better target detection, recognition and identification, and extended surveillance time; the missile includes performance at maximum range, and reduced flight and acquisition times. The February 2004 Joint requirements validation of the Stryker ORD included a revision to integrate the Javelin into the Stryker Remote Weapons Station on the ICV variant of Stryker vehicles. Javelin is part of FCS, dismounted with ICV.

CHEMICAL ENERGY MISSILES—TOW 2B AREO ANTI-TANK (AT) MISSILE

The TOW weapon system is a crew-portable, vehicle-mounted, heavy anti-armor weapon system that provides heavy anti-armor/assault capability for Army and USMC infantry. The TOW family of missiles provides a man-in-the-loop, precision-point targeting capability, which serves to minimize collateral damage—a preeminent consideration in current and emerging operating environments. The modernized TOW 2B (Aero) missile provides even greater range and countermeasure defeat to TOW-equipped units and will mitigate TOW inventory risk. The TOW Bunker Buster (TOW BB) missile was fielded to the first SBCT in November 2003 as an in-lieu-of mitigation item for the Stryker ATGM until Stryker MGS is fielded.

Program Status. The Army program plan sustains TOW industrial base at the minimum production line sustainment rate.

IMPROVED TARGET ACQUISITION SYSTEM (ITAS)

ITAS provides long-range, lethal, heavy close combat and precision assault fires capabilities for light infantry forces and SBCT. It doubles the target acquisition ranges over first-generation systems and enables maximum range engagements with TOW missiles, significantly enhancing system lethality and soldier survivability. Superior surveillance capability enables the Soldier to shape the battlefield by detecting targets at long-range and either engaging with TOW missiles, or directing the employment of other weapon systems to destroy those targets. A 90+ percent common derivative of ITAS is used in the ATGM variant of the IAV, part of SBCT.

Program Status. ITAS is in FRP and is being fielded to Active and Reserve light infantry.

GUIDED MLRS (GMLRS) ROCKET

GMLRS is the Army's primary precision strike, artillery rocket system. They replace the aging M26 unguided tactical rocket inventory, more than double the range out to more than 60km and increase accuracy to near point-hit (less than 8m GPS-aided) thus greatly reducing collateral damage and logistical re-supply burden associated with unguided area munitions. GMLRS is launched from HIMARS and M270A1 battalions assigned to modular fires brigades. GMLRS rockets fill the gap in range between direct-fire systems, short-range artillery systems, and longer range missile and air systems. GMLRS is a major upgrade to the M26 series rocket that integrates a guidance and control package and a new rocket motor.

The M30 Dual Purpose Improved Conventional Munition (DPICM) version of the GMLRS contains 404 sub-munitions (M101 grenades) to attack area targets. Fuze improvements, combined with the improved accuracy will also greatly reduce the hazard to operational maneuver and collateral damage from unexploded ordnance. A self-destruct fuze for the DPICM grenades is also being developed with European partners and will be incorporated into production. The XM31 GMLRS Unitary rocket variant will replace the DPICM sub-munitions payload with an approximate 200 lbs, HE unitary warhead, a multimode (point detonating, delay and proximity) fuze capability; and insensitive munitions (IM) rocket motor, further reducing collateral damage which enables the effects to be within danger-close proximity to friendly forces (within 200 m), as well as engaging targets in urban and complex environments with near point-hit accuracy (less than 8m GPS-aided).

Program Status. GMLRS DPICM development is an international program with the United Kingdom, Germany, France, and Italy participating. GMLRS DPICM began LRIP in FY03, and achieved IOC in second quarter FY06. GMLRS Unitary is currently a U.S.-only effort in SDD. An accelerated version of GMLRS-Unitary, with point detonate/delay fuze modes and the baseline, non-IM rocket motor, was fielded to the Multinational Corps-Iraq (MNC-I) and achieved IOC in July 2005, within six months after Army G-3 validated the MNC-I Urgent Needs Statement (UNS). Hard targets were successfully engaged September 2005; the full GMLRS-Unitary capability with tri-mode fuze, trajectory shaping and IM-compliant rocket motor will begin LRIP FY07; operational testing in FY08, with IOC late-FY08.

M982 EXCALIBUR

Excalibur is a cannon-delivered, precision-guided, extended-range family of 155mm artillery projectiles that self-guide to a programmed aim point using GPS. Excalibur will deliver better than 10m circular error probable accuracy from minimum (8km) to maximum (35-40km) range in all weather conditions. Anti-jam technology and an inertial navigation system are used to provide precision-strike capability in a GPS- jamming environment. Target and fuze data are programmed into the projectile via an inductive projectile programmer Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS). Excalibur uses an optimized (near-vertical) terminal trajectory to engage targets in urban and complex terrain with minimal collateral damage. Excalibur will overcome the limitations of current area engagement munitions with precision, increased range, lethality and minimal collateral damage.

Program Status. The Excalibur guided projectile program uses an incremental development approach to provide a combat capability to the Soldier as quickly as possible and to deliver advanced capabilities and lower costs as technology continues to mature. The initial block contains a unitary high-explosive warhead effective against point targets as well as personnel targets such as dismounted infantry, weapon crews, and light materiel targets including air defense rockets, radars and wheeled vehicles.

The initial variant of Excalibur (Block Ia-1) was accelerated in response to an Urgent Need in Iraq for a cannon-fired precision artillery capability to attack hostile forces in urban and complex terrain while minimizing collateral damage. Block Ia-1

completed its initial production First Article Test in December 2006, and after conducting a Limited User Test early in 2007 will be fielded to theater. The Excalibur Block Ia-2, which increases the maximum range to 40km, is undergoing developmental testing and is expected to enter production in fourth quarter FY07.

PRECISION GUIDANCE KIT (PGK)

PGK, formerly known as Course Correcting Fuze (CCF), is a program that will enhance the accuracy at mid to max ranges of all 155mm and 105mm artillery projectiles. The PGK program is using an incremental development approach. The requirement for the first increment is for 50m circular error probable (CEP) or less for 155mm, high-explosive projectiles; the requirement for the second increment is for 30m CEP or less for 155mm cargo and HE projectiles; and the requirement for the third increment is for 30m or less (threshold) and 10m or less (objective) CEP for all 155mm and 105mm projectiles.

The Navy's Guidance Integrated Fuze (GIF) program is a PGK candidate and represents a cooperative Navy-Army effort to demonstrate, further develop and produce a fuze that will enhance the accuracy of the current artillery ammunition stockpile. The Army strategy is to evaluate the PGK and GIF efforts and select the best candidate to enter SDD in third quarter, FY07.

Program Status. Milestone A completed and technology development began FY06.

MID-RANGE MUNITION (MRM)

MRM is an autonomous and laser-guided 120mm smart munition fired from an FCS Mounted Combat System (MCS) vehicle. This munition extends the maneuver commander's battlespace beyond line-of-sight (BLOS) to more than 12km. MRM exploits the ability of FCS-equipped BCTs to identify targets at greatly extended ranges, as well as pass digitized targeting information, in real time, to the maneuver commander or shooter. It also exploits autonomous and smart munitions technologies to provide a munition capable of being fired from a platform at extended range BLOS targets. There are currently two MRM round concepts being pursued, MRM-KE and MRM-CE.

MRM-KE is an advanced guided, boosted, kinetic energy (KE) anti-armor smart munition capable of defeating current and advanced armored threat vehicles from close in to extended BLOS ranges. It utilizes a KE rod and rocket motor technology to thrust the round towards the target at a very high speed for defeat. A millimeter-wave (MMW) autonomous seeker or SAL, along with radial maneuver thrusters, is used to acquire and guide the round towards the target with high accuracy. The projectile uses fins to aerodynamically induce spin and accelerometers to provide body motion data to ensure proper dynamics for seeker search area processing.

MRM-CE is an advanced, guided, chemical energy (CE) anti-armor smart munition capable of defeating current and advanced armored threat vehicles from fairly close in to extended BLOS ranges. It utilizes a dual tandem, chemical energy, shaped-charge warhead at relatively slow round impact speeds for target defeat. A dual-mode MMW, imaging infrared (IIR) autonomous seeker or SAL is used to acquire and guide towards the target with high accuracy. The sensors are mounted on a unique ball-joint gimbal to accomplish sensor imaging and large sensor search areas for target acquisition. The projectile uses canards and fins to stabilize the round and IMU technology to allow it to glide accurately towards the target during seeker search and terminal impact.

Program Status. MRM is an RDTE program element within the FCS BOS, is funded in the '08-13 POM and enters SDD in FY08.

Appendix 2: Protection

Protection is the sum of all actions taken to prevent an adversary's effect on the Joint force and the population that the Joint force protects. These actions include protection of personnel, infrastructure and critical computer networks. Protection is accomplished through

the planned and integrated application of several security-related and supporting operations and programs, including law enforcement, physical security, protective services operations, critical infrastructure protection, information operations, crisis response, consequence management, intelligence and counterintelligence, intelligence fusion, counterterrorism and antiterrorism, and extensively through air and missile defense (AMD) and CBRNE defense measures.

The Army's priority of efforts in force protection remain focused on supporting operational forces and equipment deployed and in-transit; capitalizing on threat reporting and coordination with international/national intelligence and law enforcement agencies; enhancing detection and deterrence capabilities for CBRNE threats; institutionalizing installation access control for personnel and vehicles; improving policy and doctrine; strengthening training and exercises; and expanding force protection assessments. Special measures must be taken to deter and mitigate the effectiveness of an adversary's use of WMDs. These measures include WMD counterproliferation, nonproliferation before an attack, active defense measures during an attack, and our ability to conduct effective consequence management following a WMD attack.

This appendix provides a brief discussion of Army AMD and CBRNE defense capabilities and key materiel programs associated with these capabilities. The importance of space-based capabilities and their role in force protection is also described.

AIR AND MISSILE DEFENSE (AMD) CAPABILITIES

AMD is revising doctrine and training to fully support the Army's Modular Force conversion and provide the combatant commander with scalable, modular and tailorable force packages that possess Joint and expeditionary capabilities. AMD transformation is consistent with and draws from Joint Operating Concepts, Joint Functional Concepts, and Joint Integrating Concepts. AMD forces—fighting interdependently with other elements of the Joint team at strategic, operational and tactical levels—will provide AMD and contribute to situational awareness/understanding, airspace management, and operational force protection to deter or defeat enemy aerial threats, protect the force and high-value assets, enable freedom to operate, and contribute to victory.

AMD'S ROLE IN THE ARMY

Transformed AMD forces must be able to dominate, enable, control, and exploit the third dimension of the AOR:

Dominate. Modular, scalable, multifunctional Army AMD formations will be employed when and where required to deter and dissuade adversaries from using air and missile threats. Mission-tailored AMD will destroy enemy aerial RSTA beyond standoff, contributing to friendly force ability to see first by forcing the enemy to see last (or not at all). Army AMD will help integrate and execute Joint offensive and defensive operations to deny enemy launch points and kill enemy air and missile threats on the ground before they can be launched. To preclude warheads or target debris from harming friendly forces or assets, Army AMD will proactively kill targets during midcourse and terminal phases of flight at sufficiently long ranges.

Enable. Army AMD will help enable the third dimension and contribute to information superiority by integrating its sensor and battle command elements into the Joint distributed network and providing continuous surveillance information that will support the Single Integrated Air Picture (SIAP) portion of a three-dimensional COP. These AMD sensors and battle command elements will provide Joint third-dimension situational awareness and understanding; provide Army linkage to the joint identification/engagement authorities; facilitate

planning, coordination and synchronization of airspace activities and linkage to the Joint Airspace Control Authority; help enable trajectory clearance for ground-to-ground, ground-to-air and air-to-ground fires; and protect friendly aerial objects.

Control. Control assures discrimination of all airspace objects, virtually eliminating the risk of fratricide; enhances force protection for air and ground forces; and increases the overall effectiveness of the force. By dominating and enabling in the airspace, Joint and Coalition forces can better exploit it for their exclusive operational benefit.

Exploit. AMD and Joint forces will exploit the third dimension by using it to conduct inter- and intra-theater operational maneuver from strategic distances and to sustain noncontiguous forces via air. Modular, multifunctional AMD task forces will be deployable on C-130/Future Force airlift and will help enable the force to project and sustain in an anti-access environment by protecting critical bases of operation and protecting Joint vertical entry forces. Army AMD ground and elevated sensors will provide extended range surveillance of aerial and ground targets that can be exploited to support offensive and defensive NLOS engagements. Army AMD elevated sensors will be multifunctional platforms providing long-endurance communications relays to distribute actionable information to enable commanders to effectively integrate, coordinate and synchronize warfighting operations with dispersed forces on the nonlinear battlefield. Army AMD and Joint forces will leverage space and aerial ISR capabilities to support Joint attack operations and provide early warning of air and missile attack to at-risk forces and civilian populations.

MODERNIZING AMD SYSTEM OF SYSTEMS (SOS) IN THE CONTEXT OF TRANSFORMATION

Army AMD SoS will require an unprecedented degree of offensive/defensive operations and capability integration within and between Joint force commands. This capability is achieved through an effective SoS application and synergy consisting of sensors, shooters and battle managers. Integrated battle command provides the AMD SoS backbone. Without the ability to provide fused, near real-time information with fire control quality data, Army AMD SoS will be unable to provide such key AMD capabilities as BLOS or wide-area engagements. There are no battle command systems that can provide fire control quality data throughout an AMD SoS, but development of a SIAP or integrated fire control capability evolution will eventually provide a single battle command solution among the Services and the Joint force.

Army AMD SoS is designed to offset current problems related to Service-specific systems, and is synchronized with other Services to lead the way to develop a Joint force AMD SoS to counter ballistic missiles, cruise missiles (CMs), UASs, tactical air-to-surface missiles, rockets, artillery and mortars, and rotary/fixed-wing aircraft threats.

As Army AMD SoS matures, the AMD force will continue to possess specific systems (e.g., Patriot), that comprise shooters, sensors, and battle managers. A mature AMD SoS will ultimately possess a common battle manager that will be supported by plug-and-fight shooters and sensors. AMD units will be supported by Soldiers who will be proficient in operating and maintaining a common battle manager, and a suite of shooters and sensors. In this context, specific systems become more transparent and less stovepiped.

Unit transformation begins with battalions but stretches across all AMD echelons. As of late-FY06, six composite AMD battalions were being fielded—each comprised of four Patriot and one Avenger battery. In the future, all AMD combat units will be pooled at the corps-level under AMD brigades for rapid integration into corps or division formations, in support of BCTs, as the operational/threat environment requires.

Army AMD transformation, comprising SoS modernization efforts, supports Joint interdependence by providing the Joint force its

only current capability against short-range ballistic missiles and by reducing focus on areas well covered by the Joint force, such as defeating the FW threat. Army AMD continues to be an essential element of Joint force operations and provides the right capabilities for Joint and Army Future Force success.

DISCUSSION OF KEY AMD MATERIEL PROGRAMS

As aerial threats possess diverse profiles and varied target characteristics, Army modernization will provide systems capable of defeating a wide range of aerial threats from advanced CMs to tactical ballistic missiles. Army modernization for AMD provides key components and capabilities of the Joint AMD SoS.

PATRIOT/MEDIUM EXTENDED AIR DEFENSE SYSTEM (MEADS) COMBINED AGGREGATE PROGRAM (CAP)

Patriot is an echelon-above-corps AMD system that can simultaneously engage and destroy multiple air and missile threats at varying ranges and altitudes. It is the world's only battle-proven theater AMD system and will be a key AMD element for the next two decades, providing combatant commanders with modular, scalable, mission-tailored capabilities to dominate, enable, and exploit the third-dimension battlespace and contribute to operational force protection in support of the Joint team.

With the approval of the Defense Acquisition Executive, the Army has combined the management, development and fielding of the Patriot and MEADS programs. The Patriot/MEADS CAP is an integral element in the DoD Ballistic Missile Defense System (BMDS) and is based on the concept that the MEADS objective capability will be achieved through an evolutionary approach by incrementally inserting MEADS major end items into the current Patriot system, thereby providing increased capability to the field in a timelier manner. This approach allows for earlier modernization and fielding of enhanced capabilities to current Patriot forces in conjunction with recapitalization efforts.

The Patriot force will complete re-organization in accordance with the Army G 3/5/7-approved January 2005 Force Design Update, which implements a force structure of thirteen Patriot-based battalions consisting of one headquarters battery and four battery battalions. Of these thirteen battalions, six will be composite AMD battalions (PAC-3 and Avenger), and seven will be pure Patriot battalions (four PAC-3 battalions and three PAC-2 battalions). While the Army National Guard will no longer possess Patriot force structure, the Compo I Patriot force will grow from 50 to 52 batteries/fire units in FY07. Currently, only 40 of the 42 AC Patriot batteries are funded for upgrades to PAC-3, allowing for a mixed force of battalions with significantly different capabilities. The Chief of Staff of the Army has approved a Pure Fleet Plan that will bring all 13 Patriot battalions to PAC-3 Configuration by the end of FY09. PAC-3 provides a remote-launch capability, which significantly extends the defended area; increases range, altitude, and firepower with the PAC-3, hit-to-kill, missile and ground support equipment; and engages multiple TBM, cruise missile and UAV threats. PAC-3 system upgrades are planned to counter evolving threats, improve joint interoperability, and increase surveillance and detection capabilities required as part of evolutionary development.

To remedy deficiencies identified in OIF and to support current operations, Congress has resourced nine capability upgrades, the final of

which will begin fielding to Patriot units in FY07. These remedies include upgraded air-to-ground communications, improved software affecting classification, identification, friend or foe (IFF) enhancements, Link-16 joint range extension, embedded data recorder replacement, radar shroud monitor, battery command post acceleration, upgrades to AMD training centers, and software-driven improvements in training scenarios to address spurious tracks and track correlation.

The Patriot recapitalization program improves operational capability by bringing existing Patriot assets to a "like-new" (zero-miles/zero-hours) state; thereby achieving OSD's Set the Force objectives and enabling the Army to meet future combatant commander requirements. The recapitalization program is planned and fully funded in FY07-10, and funding shortfalls for FY11-13 are being addressed by Headquarters, Department of the Army.

MEADS will provide Joint and coalition forces critical asset and defended area protection against multiple and simultaneous attacks by short to medium range ballistic missiles, cruise missiles, unmanned aerial vehicles, and tactical air-to-surface missiles. MEADS will have a netted and distributed architecture with modular components to increase survivability and flexibility of employment in a number of operational configurations. MEADS implements the plug and fight capability to support flexible interoperability in support of AMD Task Force requirements. It comprises a Battle Manager capable of integrating into Army and Joint SoS Battle Command architectures using Link-16 and wide-band networking capabilities to provide maximum protection of supported forces by engaging at longer ranges with distributed system operations and BLOS engagements.

The MEADS fire unit/battery features a near-vertical launcher capable of launching up to twelve missiles; a missile re-loader; the PAC-3 Cost Reduction Initiative(CRI) missile and Missile Segment Enhancement (MSE) missile; an ultra-high frequency Surveillance Radar, providing 360-degree coverage and near- to long-range detection of multiple low-radar, cross-section targets; and two X-band Multifunction Fire Control Radars that provide 360-degree coverage and are designed for high-precision handover to the in-flight missile, discrimination capabilities, and short-range target detection and horizon search.

MEADS will provide significant improvements in strategic deployability, transportability, mobility, and maneuverability. Its substantially reduced lift requirements enable MEADS to be deployed rapidly with essential combat loads via inter-/intra-theater land, sea, and airlift anywhere in the world, and its decreased size, weight, and ability to conduct rapid march order and system emplacement will provide forces better AMD.

While the PAC-3 CRI missile is the baseline missile for MEADS, the MSE missile is being developed to meet U.S. operational requirements. MSE will provide a more agile and lethal interceptor that increases the engagement envelope/defended area of the Patriot system and MEADS. MSE improves the current PAC-3 missile capability with a higher performance solid rocket motor, modified lethality enhancer, more responsive control surfaces, upgraded guidance software, and insensitive munitions improvements. The change to the missile will be incorporated into production currently planned for FY10.

Program Status. Within CAP there are two synergistic efforts: an international MEADS development effort (U.S., Germany, and Italy) managed by the North Atlantic Treaty Organization (NATO) MEADS Management Agency, and a U.S. effort to inject U.S.-specific capability requirements into the MEADS MEIs.

The Army's plan for combined management, development and fielding of the Patriot and MEADS programs was approved 7 April 2003. On 1 July 2004, the Defense Acquisition Board approved Milestone B for all three CAP increments, with

FUE in 2015 (battery-level). MS associated with Acquisition Increments 1 and 2 of the PATRIOT/MEADS CAP Fire Unit are under review as the Army and OSD seek to consolidate and align air and missile defense C2 development. (Development of the CAP Fire Unit in Acquisition Increment 3 that implements the objective tri-national Medium Extended Air Defense System (MEADS) capability is not affected by the realignment of the C2 effort.)

TERMINAL HIGH ALTITUDE AREA DEFENSE (THAAD)

THAAD is a mobile, ground-based missile defense system designed to protect forward-deployed military forces, population centers, and high-value civilian assets from short-, medium-, and intermediate-range ballistic missiles. THAAD will provide the opportunity to intercept and destroy enemy ballistic missiles that were not destroyed earlier by another anti-missile system. THAAD also protects against missiles that were not destroyed in the boost phase or midcourse phases of flight by other BMDS elements, such as Aegis or the Ground-Based Midcourse Defense System Interceptor.

A THAAD unit consists of a C2/battle management element, truck-mounted missile launchers, missile interceptors encased in canisters and mounted on the trucks, an X-band radar, and ground support equipment. The THAAD missile interceptor is comprised of a single-stage booster and a kinetic kill vehicle, which destroys enemy warheads through hit-to-kill collisions. THAAD radar is a solid-state, phased-array, X-band radar that performs search, track, target discrimination and other fire control functions. THAAD radar also sends updated target information to the kill vehicle while in flight.

Program Status. MDA is developing THAAD in incremental, capabilities-based blocks. Flight tests began in FY06 as part of an extensive test and evaluation program to demonstrate the capability of the ongoing R&D activities. Although currently funded by MDA, the THAAD program will transition to an Army weapons system. The first THAAD fire unit will begin fielding in FY09, with a second in FY10.

FORWARD BASED, X-BAND RADAR-TRANSPORTABLE (FBX-T)

The FBX-T radar, now termed AN/TP2 radar, is comprised of the same hardware that makes up the radar component of the THAAD weapon system. However, it has a software configuration that can be used to provide ballistic missile early-warning, detection, and guidance information to other elements of the BMDS system. This versatile radar can be deployed in several environments to enhance BMDS effectiveness.

The Forward Based X-Band Transportable radar has four major components: the radar antenna, a cooling unit, a power unit, and an electronics unit. These components make up a powerful sensor which can provide vast radar coverage for BMDS.

Program Status. One of these radars is deployed in northern Japan; a second is scheduled to be deployed in PACOM theater early FY07. A third and fourth radar will follow in FY08 and FY10, respectively, at locations to be determined.

SURFACE-LAUNCHED ADVANCED MEDIUM-RANGE AIR-TO-AIR MISSILE (SLAMRAAM)

SLAMRAAM is the Army's only medium-range weapon system designed to protect designated critical assets and maneuver forces from the emerging, stressing cruise missile and UAV threat. SLAMRAAM is a key component of the AMD composite battalion and will complement the PAC-3 and MEADS systems. Without SLAMRAAM, the Army and Joint force (based on the cancellation

of CLAWS by USMC) will not have a dedicated, lethal capability against stressing cruise missiles, UAVs and other air-breather threats.

SLAMRAAM is a lightweight, day-or-night, adverse-weather, NLOS weapon system with engagement capabilities in excess of 18km. It is comprised of a HMMWV-mounted launcher with common joint launch rails, launcher electronics, onboard C4 components, and 4-6 AIM-120 Advanced Medium-Range Air-to-Air Missiles (AMRAAMs); an Integrated Fire Control Shelter (IFCS) to C2 its sensor and launchers; and the Sentinel Enhanced Target Range Acquisition Classification radar to provide surveillance and fire control data. The IFCS is the first step in the development of a full IFC capability in the Army. The system also will be capable of receiving data from other Joint and Army external sensors when available. SLAMRAAM is critical to the successful development and fielding of the IAMD SoS.

Program Status. SLAMRAAM entered the SDD phase in September 2003. It is funded for development and fielding of one battery in FY09 and one battalion in FY11.

GROUND-BASED MIDCOURSE DEFENSE (GMD)

GMD is a fixed site, land-based SoS designed to provide limited protection to the United States against an intercontinental ballistic missile attack. Its architecture is comprised the GMD Communications Network (which extends throughout CONUS and overseas to Alaska and Hawaii), the GMD Fire Control, In-Flight Interceptor Communications devices, the Ground-Based Interceptors, and a series of radars that not only detect and track targets, but also guide the interceptor to an incoming missile. The GMD SoS radars include several Upgraded Early Warning Radars, the Forward Based X-Band–Transportable Radar, the Aegis Ballistic Missile Defense, Sea-Based X-Band Radars, Space-Based Infrared System and its Defense Support Program predecessor.

Program Status. The GMD, as an element of the MDA's broader BMDS, is a capabilities-based developmental acquisition program utilizing a block approach. The system is constantly evolving, and capabilities are being fielded as they are developed. The Army has served as lead Service for the GMD (less acquisition) since 1999, and today has focused its efforts on providing installation support, facilities, resources, force protection and operational personnel in support of the deployed capability which also serves as a developmental test bed. Currently, GMD meets the National Command Authority's directive of providing a fielded limited operational capability against ballistic missile threats.

COUNTER-ROCKET, ARTILLERY AND MORTAR (C-RAM)

The primary mission of the C-RAM program is to develop, procure, field and maintain a system that can detect rocket, artillery and mortar (RAM) launches; warn the defended area with sufficient time for personnel to take cover; intercept rounds in flight, thus preventing damage to ground forces or facilities; and enhance response to and defeat of enemy forces. C-RAM is a SoS, comprised of a combination of multi-service fielded and NDI sensors, C2 systems, and a modified Navy intercept system, with a low-cost COTS warning system and wireless local area network. The system will be fielded to various echelons, fixed or semi-fixed site, providing them correlated air and ground pictures and linking them to the ABCS and the Joint Data Network, via various forms of communications, to provide situational awareness and exchange of timely and accurate information.

The fielding of the objective C-RAM SoS will be accomplished through an incremental fielding approach driven by an urgent need, theater priorities, and emerging capability requirements to provide counter-RAM capability to fielded forces. Increment I (FY05-13) delivers a partial C-RAM SoS capability for fixed and semi-fixed sites. Increment II (FY14-'23) delivers a full C-RAM SoS capability for fixed and semi-fixed sites, and encompasses protection for Joint critical assets using next

generation C4, sensors, and interceptors in a structured Joint organization. Increment III (FY23) and beyond, the objective capability provides full integration with FCS. It includes network-enabled operations and protection of mobile assets using advanced technologies, leading to a Joint integrated Defeat-RAM (D-RAM) capability. Increments II and III depend on the readiness of future technologies, value to the operational concept, enemy threat, affordability, and integration considerations at the element and SoS level.

Program Status. C-RAM equipment has been fielded to seven FOBs, and the system has been validated through participation in multiple operational testing events conducted by ATEC.

JOINT LAND ATTACK CRUISE MISSILE DEFENSE ELEVATED NETTED SENSOR SYSTEM (JLENS)

JLENS is DoD's only persistent, elevated, wide-area surveillance and fire control sensor system currently under development. It is a critical component of both the Army AMD Future Force and the Joint force CMD kill chain. Without JLENS, the Army and Joint force will not have an elevated sensor capable of providing persistent surveillance cuing and fire control quality data (based on the USAF's cancellation of the E-10 program) to ground-based shooters in order to protect the force against stressing cruise missiles at extended ranges.

JLENS uses advanced sensor and networking technologies to provide 360-degree Wide Area Surveillance Radar and Fire Control Radar against the emerging, stressing land attack cruise missile threat as well as other air-breathing threats to include UAVs, UCAVs, and rotary and FW platforms. It will also provide surface moving target data and TBM boost launch warning to the Joint force, and can also serve as a long-endurance communications relay. JLENS enables Joint and Army Integrated Air Missile Defense to conduct beyond LOS and NLOS engagements. JLENS directly supports all facets of Joint Theater AMD (JTAMD) active air defense and contributes to offensive counter air attack operations and C4I through multi-link dynamic data distribution. This system supports the JTAMD mission set execution by providing surveillance and supporting integrated fire control, and aerial CID activities.

JLENS is a major contributor to the JTAMD Capstone Requirements Document objectives of SIAP and CID, providing precision tracking and measurement information. As a key element of the SIAP, JLENS correlates organic tracks/measurements with IFF and Precise Participant Location Identification data which, when correlated, is placed on the external networks. JLENS can stay aloft for up to 30 days, providing 24-hour battlespace coverage over extended areas. JLENS is an Army-led, Joint interest program.

Program Status. JLENS is being developed, demonstrated, and procured using an evolutionary acquisition strategy consisting of spirals and increments that lead to the fulfillment of ORD requirements. Block 1 consists of two spirals, with spiral 2 meeting Block 1 requirements. Each spiral is being constructed to support air directed surface-to-air missile (ADSAM) engagements, SIAP and CID capabilities. Block 2 will provide increased fire control and wide area surveillance capability with each sensor hosted on a non-tethered platform. Block 3 provides an increased system capability with sensors hosted on a single non-tethered platform for high mobility. JLENS Block 1 successfully completed its Milestone B in FY05 and is currently in SDD. It is an ACAT 1D program with a FUE in FY11. The Milestone C decision is scheduled for FY10.

SENTINEL

The Sentinel radar is the ground maneuver commander's only sensor designed to provide Joint low altitude air coverage and is critical for airspace SA/SU, deconfliction and advanced early warning.

Sentinel radar employs a modern phased array antenna that automatically detects, tracks, classifies and identifies CMs, UAVs, helicopters and fixed-wing aircraft to cue MAMD weapons systems. Sentinel is comprised of a radar-based sensor

system with its HMMWV prime mover, power, IFF, and C2 interfaces. The antenna/transceiver group has an advanced third dimensional battlefield air-defense radar housed aboard a light tactical trailer chassis. Targets can be hovering or fast moving, from nap of the earth to the maximum engagement altitude of MAMD weapon systems. The radar operates in the X-band, transmitting 1,100 pencil beams per rotation. It rotates at 30 rpm (two-second update). Sentinel, with the enhanced target range and classification system (ETRAC), improves operations in a joint environment to detect smaller cross section targets and is critical for airspace SA / SU, deconfliction and advanced threat early warning. ETRAC upgrades add 20 rpm (three-second update) rotation and staring capability to enhance the detection and tracking of CMs. The instrumented range and altitude are 40km and 4km, respectively. The Sentinel utilizes the SINCGARS and EPLRS radios to provide a track file of more than 60 targets. Sensor data is passed through the FAAD-C2 system to MAMD weapon systems. Sentinels will be organic to the AMD Composite and the Avenger/SLAMRAAM (Pure) battalions, providing 360-degree surveillance to counter CMs, UAVs and other ABTs, enabling Avenger today and SLAMRAAM in the future to defeat those threats.

Program Status. The program is currently undergoing preplanned P3I to improve surveillance and tracking capabilities. Additional upgrades and system modifications are currently scheduled through FY11 for many Active and Reserve units to improve target identification, increase Joint combat ID capabilities, and reduce the potential for fratricide. ETRAC modifications will be applied to 74 radars by FY11. The ETRAC modifications consist of two upgrades: Phase 1A improves the radar detection range against low-observable and stealthy targets; Phase 1B improves the radar classification of low-observable and stealthy targets at extended ranges. The Phase 1B capability for target airframe classification will support the Joint identification and target classification function that allows maneuver weapons to operate at maximum effectiveness.

AIR AND MISSILE DEFENSE PLANNING AND CONTROL SYSTEM (AMDPCS)

The AMDPCS integrates Air and Missile Defense (AMD) operations for Air Defense Artillery (ADA) brigades, Army Air and Missile Defense Command (AAMDC) headquarters, ADAM cells, and Joint C2 elements. AMDPCS enables air defense/force operations (FO) through two major systems: Air and Missile Defense Workstation (AMDWS) and the Air Defense System Integrator (ADSI).

The AMDWS is the FO tool used for collaborative planning and coordination of AMD operations and is the AMD gateway interface to the ABCS. AMDWS provides the air component of the COP to ABCS. AMDWS is interoperable with other ABCS systems, thereby allowing access to collaborative planning data such as maneuver graphics and overlays with other units and staff elements. AMDWS is the means through which users exchange U.S. Message Text Format messages with ABCS or ABCS-associated systems. AMDWS interfaces/interoperates with the USAF Theater Battle Management Core System, as well as the Joint Defensive Planner. AMDWS receives, fuses, and distributes time-sensitive information to support operator inputs necessary for decision cycle dominance. Computer displays enable access to the air picture, situation reports, enemy assessments, and friendly force status. The tactical mission planner displays weapons engagement zones, sensor coverages, and friendly order of battle information.

The ADSI is a high-speed processor/workstation that serves as a real-time bridge between tactical data links, radars, and intelligence data sources. ADSI receives, processes, correlates, and displays tracks from local radars, tactical data links, and intelligence sources with minimal user interaction. The ADSI passes data to the Tactical Airspace Integration System Airspace Workstation). ADSI provides air picture situational awareness and disseminates FO data via AMDWS into the ABCS. ADSI displays tracks and maps, creates and displays geometries and boundaries, filters inputs from multiple sources, maintains track associations and histories, and disseminates fire control/fire

direction commands. ADSI performs tactical data link translations.

Program Status. The FY08-13 program plan funds AMDPCS to complete the IOC of the 32nd AAMDC in FY08, fields an AMDPCS to the newly activated 164th ADA Brigade in FY09, completes, upgrades to the 6th ADA Brigade (Training) in FY10 and fields AMDCPS to the three additional ADA Brigades in FY11-13.

FORWARD AREA AIR DEFENSE–COMMAND AND CONTROL (FAAD-C2)

The FAAD-C2 system collects, digitally processes, and disseminates real-time target cueing and tracking information, the common tactical air picture, and command, control and intelligence information to Maneuver Air and Missile Defense (MAMD) weapon systems and Joint and combined arms systems. The FAAD-C2 system provides alerting data to air defense gunners, air space battle management, and uplinks mission operations, thereby enhancing force protection against air and missile attack. Situational awareness and targeting data are provided on threat aircraft, cruise missiles, and UAVs. The FAAD-C2 system provides this mission capability by integrating dynamic FAAD-C2 engagement operations software with the Multifunctional Information Distribution System, Joint Tactical Terminal, SINCGARS, Enhanced Position Location System, GPS, Airborne Warning and Control Systems, Sentinel radar, and the Army's ABCS architecture.

In addition, FAAD-C2 provides interoperability with Joint C2 systems and horizontal integration with PATRIOT, THAAD, MEADS, and JLENS by fusing sensor data to create a scalable and filterable SIAP and common tactical picture. The system software is a key component of the ADAM Cell that is being fielded to BCTs and division headquarters as part of the Army's modularity concept.

The FAAD-C2 software has been fielded to ADAM cells in the 1st Cavalry; 3rd, 4th, and 25th Infantry; 101st Air Assault; and 10th Mountain divisions, and to the first three SBCTs. FAAD-C2 also is a principal air defense system within the Homeland Security Program. Soldiers from activated Army National Guard missile air and missile defense battalions operate the FAAD-C2 systems in the National Capital Region and other locations.

Program Status. The FY07-11 program plan funds FAAD-C2 fielding to the Army National Guard (2-174th and 1-265th ADA battalions). FAAD-C2 program funding will provide FAAD-C2 Engagement Operations Workstation (EOWS) in 92 ADAM cells.

AIR DEFENSE AND AIRSPACE MANAGEMENT (ADAM) CELL

The ADAM system, a configuration of AMDPCS, provides a modular, scalable cell, consisting of air defense and aviation personnel and equipment, capable of providing airspace management, planning and coordination, using third dimensional situational awareness and situational understanding obtained from sensors in theater and Joint/Allied data exchange via JDN. The ADAM cell is organic at corps, division, BCT, SBCT, and fires brigades, and is equipped with AMDPCS and FAAD-C2 WSs manned by air defense personnel. AMDPCS component includes an AMDWS, and an ADSI WS. FAAD-C2 component includes an EOWS with an intelligence processor. Additionally, the ADAM cell is equipped with the TAIS AWS, and at the SBCTs-it includes an Aviation Mission Planning WS, both WSs manned by Aviation personnel.

Program Status. ADAM cells will be funded through the AMDPCS program element primarily through supplementals and PBD 753. Current funding will provide 122 ADAM cells to meet Army Modular Force MTOE authorizations and will be assigned one per corps and six per division. Within the division, ADAM cells are located in Tactical Command Posts One and Two, and one each in the four BCTs. Additionally, one each ADAM cell is authorized in the Fires brigade. Consideration is being given to ADAM cells for each modular Combat Aviation, Combat Support, and Battlefield Surveillance brigades. To date, the Army has fielded 42 ADAM cells and will field an additional 75 in FY07-11.

JOINT TACTICAL GROUND STATION (JTAGS) MULTI-MISSION MOBILE PROCESSOR (M3P)

M3P is a P3I of the current, operationally proven JTAGS system. M3P's will be acquired as part of the mobile ground segment for the SBIRS; the successor to the DSP. M3P is a transportable missile warning and communications system that will receive and process direct down linked raw data from DSP satellites and the follow-on SBIRS sensors. The three forward-deployed systems support simultaneous operations in multiple theaters, providing the combatant commander with in-theater tactical ballistic missile warning, alerting, and cueing data. The M3P with SBIRS sensors will provide battlespace characterization data for situational awareness. M3P will provide warning and situational awareness data down to the tactical command level. An M3P detachment's equipment will include a 42-foot van, two 100-kW generators, three 5-ton cargo trucks, one 5-ton tractor, three tri-band antennas, and one HMMWV.

Program Status. The Army plans to replace the five fielded JTAGS with the M3P systems, three of which are permanently forward deployed, beginning in FY12/13. The JROC-approved ORD calls for a total of seven M3P systems. The transition to M3P is expected as the SBIRS Geosynchronous satellites are launched and assume operational capability. The current M3P baseline program has not been approved on the SBIRS program. While the Air Force is reassessing the need for mobile systems in its strategic warning mission, the Army plans to move forward with the acquisition of theater-only M3Ps. A request for funding is planned for the FY08-13 POM.

In FY13, M3P is anticipated to begin incorporation of data from the technologies developed by the MDA and their development efforts with the Space Tracking and Surveillance System (formally SBIRS Low). MDA currently is conducting technology demonstrations that will lead to a Low Earth Orbit constellation in support of theater tactical missile warning.

ARMY INTEGRATED AIR AND MISSILE DEFENSE (AIAMD) BATTLE MANAGEMENT COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE (BMC4I)

The Army continues working to increase interoperability and integration among the various current and future Army AMD weapon, sensor and communications platforms to achieve significant increases in operational effectiveness and efficiency. The development and fielding of common AIAMD BMC4I assets will allow the employment of scalable, modular "plug and play'' AMD capabilities against the full spectrum of threats throughout the battlespace to support the Army and Joint current and Future Force.

Program Status. Development of a common AIAMD BMC4I is being undertaken in three major increments. The first increment, which is mostly accomplished, was primarily DOTLPF-focused with minimal materiel development or fielding. The second increment will use a variety of hardware and software solutions to enable an Army integrated net-centric common AMD battle command and integrated fire control capability. The third increment aims at realizing the full capabilities of an Army common IAMD BMC4I, including 360-degree extended-range active protection against TBM threats while positioning the Army to become fully integrated with FCS. The effort is on track for an MS B decision in FY07 and am MS C decision in FY10.

LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR) AN/TPQ-48

The LCMR is a developmental, lightweight, man-portable weapons location sensor that provides continuous 360-degree accurate mortar location up to a range of 5km. LCMR was originally developed for the U.S. Special Operations Command in response to 1999 MNS described by the 75th Ranger Regiment for automatic location of indirect fire weapons, with emphasis on mortars. The MNS also identified the requirement for a sensor with 360 degrees of azimuth coverage that was small and light enough to be inserted with airborne

troops (door or ramp bundle) and transported on the ground by two persons. Enhancements, AN/TPQ-48 (V2), were implemented to refine the design and to address feedback received from users during both testing and operational use in OEF. A developmental effort for the AN/TPQ-48 (V3) system and delivery of 13 (V3) prototypes has been initiated to provide improved operational and physical functionality over the existing LCMR (V1) and (V2) radar systems, shall have increased accuracy and range, be highly mobile and two-man transportable, have improved emplacement capabilities, and be a ruggedized battlefield radar system.

Program Status. There are currently 31 LCMR AN/TPQ-48 (V1) fielded systems supporting OIF and OEF. In June 2005, a contract action incorporated the C-RAM requirement for one LCMR (V2) system. Contract actions were initiated in July 2005 to incorporate the C-RAM requirement for 34 LCMR (V2) systems and the USSOCOM requirement for 20 LCMR (V2) systems, respectively. In August 2006, a contract was signed acquiring 150 AN/TPQ-48 (V2) systems for the Army's requirements. Deliveries of these systems are anticipated to start in March 2007. A long-term contract for additional AN/TPQ-48 (V2), (V3) systems and technical and logistical engineering support services is anticipated to be early in 2007.

FIREFINDER SYSTEMS (MODERNIZATION EFFORTS)

ANTPQ-36

The AN/TPQ-36 is a mobile phased-array Mortar Locating Radar that automatically and accurately locates mortars, artillery, and short-range rocket launchers. The AN/TPQ-36 is the primary target acquisition and counterfire system for field artillery in support of divisions, separate brigades, and rapid-deployment task forces.

Program Status. Firefinder AN/TPQ-36 systems have been supporting our forces for over 25 years, and modernization projects are key to meet new threats and perform to today's standards. An electronics upgrade which replaces the shelter of the AN/TPQ-36 and incorporates the first electronics upgrade to the 1970s technology is underway. A key element of this upgrade is the MILTOPE computer system that provides modern computer capabilities. This program corrects identified deficiencies in range, false target rate, target throughput, target classification and displacement time. It also replaces electronic components, which are rapidly approaching obsolescence with standard Common Hardware/Software and COTS equipment. Another major upgrade is the radar processor replacement program that delivers a new radar processor with increased performance and reliability. The third major upgrade involves the RECAP program, which provides a total system to the Soldier that is zero miles/zero hours standard and uses current technology to solve parts obsolescence and improve reliability, maintainability and sustainability. These major system upgrades bring the AN/TPQ-36(V)8 systems to a position in which they can effectively and efficiently continue to support the soldier in the near and mid term.

AN/TPQ-37

The AN/TPQ-37 Artillery Locating Radar uses a combination of radar techniques and computer-controlled functions to detect and accurately locate artillery and rocket weapons with sufficient accuracy to permit rapid engagement with counterfire. The AN/TPQ-37 is phased-array radar with longer target acquisition range than the AN/TPQ-36 allowing it to locate long-range artillery and rockets.

Program Status. Firefinder AN/TPQ-37 systems have been supporting our forces for over 25 years and modernization projects are key to today's standards. Major current system upgrades include the Fire Support Digitization upgrade to the AN/TPQ-37(V)8 that incorporates new computer hardware and software modifications to allow AFATDS connectivity and enhance communications, accuracy and throughput. This upgrade will provide commonality with the AN/TPQ-36(V)8 electronics upgrade LMS Shelter's MILTOPE suite by replacing the obsolete Versatile Computer Unit with the MILTOPE 750M. Another

key modernization project is the Reliability and Maintainability Improvement Plan which maintains current performance while reducing the logistics footprint, life-cycle costs and training. This effort provides for a new Radar Processor that is common in hardware to the AN/TPQ-36, as well as a new transmitter that operates to today's standards and incorporates new technology. The third major system upgrade being implemented is the Block I upgrade with Roll-on/Roll-off capability. This also provides for a New Cooler, Timer, Dehydrator and a Modular Azimuth Positioning Systems. These major system upgrades bring the AN/TPQ-37(V)8 systems to a position in which they can continue to support the Soldier in the near- and mid-term.

ENHANCED AN/TPQ-36 (EQ-36)

The EQ-36 radar is a replacement for the aging AN/TPQ 36 and AN/TPQ-37 counterfire radar systems. The EQ-36 is a system technology upgrade that provides a 360-degree capability with improved range and accuracy in a clutter environment.

Program Status. The EQ-36 will be produced in two increments based on two tiers of technical threshold requirements. Increment I requirements will incorporate 360-degree coverage, improved 90-degree range and accuracy, single C-130 sortie capability and AFATDS interoperability. Increment II will incorporate improved 90- and 360-degree range and accuracy capabilities. Enhancements include increased performance in high-clutter, improved accuracy from .65 percent of range to .30 percent of range, and improved range from 14.5km to 32km for cannon and 24km to 50km for racket. Crew size will be reduced from six to four for Q-36, and from 12 to four for Q-37. Programmed funding fully funds RDTE for increments I and II, provides for five radar systems for integration and testing, and procures 185 production systems at the most economical production rate.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR (CBRN) DEFENSE CAPABILITIES

The Army's concept to employ focused defense against CBRN weapons enables units to operate at the lowest required protective posture without increasing risk to the Soldier. CBRN reconnaissance and surveillance units, with their point and standoff detectors and battle management/C2 procedures, are the principal means of contamination avoidance. This protection extends throughout the full spectrum to include homeland defense. The Army is augmenting installation commanders with the ability to respond to terrorist and CBRN attacks through equipping and training. CBRN defense systems, obscurants and their enabling technologies allow the Army to fully achieve force protection, information dominance and full-dimensional protection in a WMD environment. The Army's CBRN defense strategy is to employ a focused defense against CBRN threats so that only units directly affected by the hazard would be warned to take protective measures. Using focused defense, large numbers of units will no longer assume full protective posture as a precautionary measure. Focused defense allows units to operate in the lowest required protective posture without increasing the risk to Soldiers. The Army's obscuration strategy is to deny the threat's use of the visual as well as the electromagnetic spectrum while preserving our ability to exploit it at will.

In addition to providing the means of general CBRN defense and obscuration common to all units, the Army provides increased CBRN defense and obscuration capabilities with specialized chemical units. With their point and standoff detectors, CBRN reconnaissance and surveillance units are the principal means of contamination avoidance. Biological detection units provide capabilities to shorten response times to initiate the medical response to the growing threat of biological warfare agents. Decontamination units restore combat power after resources (personnel, equipment and facilities) are contaminated.

Chemical Vision 2010 is the implementing vision of the Army's CBRN defense modernization effort. It enables the commander to minimize casualties and preserve combat power in a CBRN environment and to create information superiority by using C2 information systems and obscurants. Operationally, if the enemy has an offensive CBRN capability, our

primary goal is to deter the threat's use. If deterrence fails, the mission is to defend against a CBRN attack with minimal casualties and degradation, allowing commanders to quickly restore full combat power and continue their mission across the full spectrum of operating environments.

In providing the CBRN defense and obscuration systems for the Army's transformation strategy, the Army will equip its specialized chemical units and provide CBRN defense and obscuration items common to all units in accordance with the three tenets of the Army's overall modernization strategy: (1) focusing S&T efforts on the Future Force, (2) meeting immediate SBCT operational needs, and (3) maintaining and improving the warfighting capabilities of the rest of the current force through a judicious combination of selected modernization, recapitalization and sustained maintenance of essential systems. The following paragraphs elaborate on some of the key CBRN systems in the Army's modernization plans, although additional systems are also under development.

DISCUSSION OF KEY CBRN MODERNIZATION PROGRAMS

M31A1/M31E2 BIOLOGICAL INTEGRATED DETECTION SYSTEM (BIDS)

BIDS is a collectively protected, shelter-mounted on a dedicated vehicle (HMMWV), and equipped with a biological detection suite employing complementary technologies to detect large-area biological attacks. The M31E2 BIDS is capable of detecting all types of biological agents in less than 10 minutes, and identifying any 10 agents simultaneously in less than 30 minutes.

Program Status. The M31A1 and M31E2 versions of the BIDS are currently fielded. All new activating units will receive the M31E2 version.

STRYKER-NUCLEAR, BIOLOGICAL AND CHEMICAL RECONNAISSANCE VEHICLE (NBCRV)

The Stryker-NBCRV incorporates integrated chemical and biological point detectors that allow on-the-move standoff biological and chemical agent detection. The Chemical Biological

Mass Spectrometer improves the detection and identification of liquid chemical agents, while JBPDS provides a first-time biological agent detection capability to the reconnaissance platform. The sensor suite automatically integrates contamination information with data from onboard navigation and meteorological systems and rapidly transmits contamination hazard and non-contaminated area intelligence to the appropriate operations center. Integration of the common CBRN technical architecture allows for expansion/upgrading of the onboard computers at minimal cost, as well as the command and control of CBRN-sensing UAVs and unmanned ground vehicles in the Future Force system.

Program Status. Stryker-NBCRV Milestone C was reached in fourth quarter, FY04, allowing the start of LRIP. The FRP decision is scheduled for fourth quarter, FY07. The Stryker-NBCRV begin fielding in FY06, will field to HBCTs in FY09 and is planned for chemical companies in FY11.

JOINT CBRN DISMOUNTABLE RECONNAISSANCE SYSTEM (JCDRS)

The JCDRS is a developmental system containing CBRN sensors specifically designed for dismounted use during the assessment of sensitive sites that are inaccessible by mounted CBRN reconnaissance vehicles. The JCDRS provides the warfighter with handheld chemical, biological, radiological and nuclear sensors and individual protective equipment incorporated on a specialized HMMWV

trailer that can be used to assess hazardous materials incorporated into weapons or that are produced by industry.

Program Status. The JCDRS is expected to begin fielding NLT FY11. It will be issued to CBRN Recon platoons assigned to IBCTs, heavy chemical companies, Special Forces Chemical Response Decon units, and potentially to Hazardous Response Decon (HRD) platoons.

M56 WHEELED SMOKE SYSTEM (COYOTE)

The M56 Coyote provides large-area, multi-spectral screening for maneuver and support forces from the M1113 HMMWV, and can generate large-area obscurants throughout the battlespace to counter enemy reconnaissance, surveillance and target acquisition systems. Missions include providing static and mobile visual, IR screening in the form of a haze, blanket and curtain. Major components include a turbine smoke-generating system. It has the capability of providing continuous visual smoke for up to 90 minutes and 30 minutes of IR screening smoke. A proposed P3I can add a 30-minute millimeter wave obscuring capability to defeat enemy radar RSTA devices and weapon systems. A two-person crew operates the M56 and has the capability to counter the threat arising from the wide proliferation of advanced visual and IR sensors.

Program Status. Fielding of the M56 is complete. Limited production of six M56E1 systems is expected NLT FY08. The PM is currently exploring options to improve system survivability. The AAO of 265 has been met.

M6/M7 VEHICLE OBSCURATION SMOKE SYSTEMS

Vehicle obscuration smoke systems provide an immediate smoke screen that can obscure threat surveillance, target acquisitions, and weapon guidance systems in the visual through infrared spectrum. The system provides approximately 20-120 seconds of obscuration, which enables the vehicle to maneuver out of the immediate threat area. The M6 countermeasure discharger is installed on Stryker platforms to provide this capability. The M7 Light Vehicle Obscuration Smoke System provides this capability for up-armored HMMWVs. Both systems utilize 66mm grenades and a launcher configuration of four tubes. Multiple launcher systems are utilized to provide all-around screening capability.

Program Status. The M6 program is currently funded to equip all SBCTs.

CHEMICAL BIOLOGICAL PROTECTIVE SHELTER SYSTEM (CBPSS)

The CBPS is a self contained highly mobile, rapidly deployable chemically protected shelter system designed for emergency medical use in the forward battle areas. The shelter consists of an air beam-supported soft shelter offering 300 sq ft of working space, power systems and environmental control equipment. The foldable shelter, power system and environmental control equipment is housed on a lightweight multipurpose shelter, mounted on an expanded capacity vehicle with a modified 1-1/4-ton, high-mobility trailer which has a permanently mounted tactical quiet generator set.

Program Status. CBPS program currently is reviewing design options to convert the existing CBPS systems from an un-armored HMMWV to an up-armored Medium Tactical Vehicle platform. There are contracts in place to retrofit systems to the new design and to procure an additional 174 CBPS-M3 electric version systems. CBPS fieldings will continue through FY13.

CHEMICALLY PROTECTED DEPLOYABLE MEDICAL SYSTEM (CP DEPMEDS)

The CP DEPMEDS is a containerized collective protection system that provides U.S. Army Deployable Medical System (DEPMEDS) Combat Support Hospitals (CSH) the capability to sustain medical operations in a CBRN environment for 72 hours. The system consists of modular M28 chemical/biological protective liner sections, 200 hermetically sealed filter canisters, recirculation filters, pressurized protective entrances, additional

power generation, a CBRN-protected water system, low-pressure alarms, and CBRN protected latrine facilities for patients and staff.

Program Status. CP DEPMEDS AAO specifies 23 systems. The Joint Operational Requirements Document (JORD) was updated in October 2003 to reflect the Medical Reengineering Initiative configuration, which allows for smaller, split-base hospital operations and can deploy incrementally to protect a 44-bed early entry hospital, an 84-bed hospital company, a 164-bed increment, or a full-up 248 bed CSH.

JOINT CHEMICAL AGENT DETECTOR (JCAD)

JCAD will be a combined portable monitoring and small point chemical agent detector for individual Soldier applications. This handheld, pocket-sized detector will be designed to automatically detect, identify and quantify chemical agents. The primary function of the JCAD is as a chemical weapon agent (CWA) point detector that can be used to detect, identify, quantify and warn personnel of the presence of vapor CWAs. Follow-on increment will also detect specified Toxic Industrial Chemicals.

Program Status. Testing of a candidate system is underway at Edgewood Chemical Biological Center. Increment I fielding is scheduled for fourth quarter, FY07. Increment II is scheduled for FY10.

JOINT CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL AGENT WATER MONITOR (JCBRAWM)

JCBRAWM will provide the warfighter the capability to detect, identify and quantify the presence of CBR contamination in water. The ICD, approved 2 April 2004, describes the need for monitoring to protect the warfighter from drinking or using contaminated water. The JCBRAWM will detect and identify CBR agents during three water-monitoring missions: source site selection, treatment verification and quality assurance of stored and distributed water.

Program Status. The system is pre-milestone B and will potentially be fielded as incremental capabilities for each separate threat.

JOINT WARNING AND REPORTING NETWORK (JWARN)

JWARN provides standard integration and analysis of NBC detection information with command, control, communications, computers, information and intelligence on the battlefield. JWARN automates the NBC warning and reporting processes now performed manually throughout the Services. It will provide additional data processing, production of plans and reports, and access to specific NBC information to improve the efficiency of NBC personnel. JWARN will be integrated on MCS and GCCS-A in the near term and FBCB2 in the out years.

Program Status. JWARN will be distributed as a module of the MCS and GSSC-A systems. IOC will be achieved when JWARN is fielded to initial units and training bases, unit personnel are trained, training base is established, and a maintenance system is in place.

JOINT EFFECTS MODEL (JEM)

JEM will provide the commander with advanced modeling and simulation capability to forecast and display the effects of CBRN events, including TIH, based on inputs from JWARN-networked sensors, intelligence and other units. JEM supports force protection and operational deployment planning by providing critical CBRN/TIH planning and defensive information.

Program Status. JEM Increment-I is currently in the SDD acquisition phase. MS C is expected in fourth quarter, FY07.

JOINT SERVICE TRANSPORTABLE DECONTAMINATION SYSTEM (JSTDS)

This mobile system provides the capability to conduct operational and thorough decontamination of medium-to-large mobile or fixed equipment, aircraft, facilities, shelters, surface areas and terrain. The small-scale system (JSTDS-SS) replaces the M17 LDS and M12A1s in non-chemical units. The large-scale system (JSTDS-LS) will be integrated into or mounted on a dedicated vehicle/system. The large-scale system replaces the M12A1 in chemical units. Specifically, this will be a cross-spectrum system designed to support current and Future Forces, or homeland security operations. It will be capable of decontaminating fixed sites, terrain, large aircraft and seaports of debarkation and aerial ports of debarkation.

Program Status. MS C decision was reached in May 2006. JSTDS-SS IOC is scheduled for FY10. FOC is scheduled for FY12. IOC of 350 JSTDS-LS is scheduled for FY13. FOC is scheduled for FY15.

JOINT SERVICE PERSONNEL/SKIN DECONTAMINATION SYSTEM (JSPDS)

JSPDS replaces the M291 SDK and will decontaminate the skin, individual equipment and weapons of personnel IOC is scheduled for FY07 and will be achieved when JSPDS is fielded to forward-deployed units, rapid deployment units, unit personnel are trained; a training base is established; and a maintenance system is in place.

Program Status. IOC is scheduled for FY10. FOC is scheduled for FY13 and will be achieved when the JSPDS AAO is reached and all authorizations are filled. Total number of systems is 2,285,451.

JOINT PLATFORM INTERIOR DECONTAMINATION (JPID) SYSTEM

JPID will consist of a decontaminant(s) and an applicator for use primarily in immediate and operational decontamination operations. The target items for decontamination will be small non-sensitive equipment and key areas on large non-sensitive equipment. The JPID will decontaminate threat agents to lower levels than current portable systems used for these operations.

Program Status. The IOC for this system is projected in FY10, with FOC planned for FY13.

JOINT SERVICE SENSITIVE EQUIPMENT DECONTAMINATION SYSTEM (JSSED)

JSSED provides a first-ever capability to decontaminate chemical and biological warfare agents and toxins from sensitive electronic, avionics, and electro-optic equipment. Its use will be compatible with and not degrade sensitive materials or equipment. It will be operator safe and offer protection from off-gassing and direct liquid exposure during decontamination.

Program Status. IOC for this system is projected in FY10, with FOC planned for FY13.

JOINT SERVICE GENERAL PURPOSE MASK (JSGPM)

The XM50 and XM51 are two new protective masks that make up the JSGPM lightweight mask system. Each mask consists of a face-blank assembly (singular skin molded in small, medium and large sizes, and incorporating provisions for lenses), front module cover, head harness assemble (mesh-type head harness), self-sealing valve, inlet/outlet valve, internal drink tube (external drink tube assemble), carrier, waterproof bag, canteen cap, dust cover, laser outsert, primary filters (filters out chemical/biological agents, and radioactive and other particles from contaminated air), operator cards and accessories as required. The masks allow intelligible voice transmissions (face to face and three meters apart).

Program Status. FRP memo is projected to be signed in April 2007.

Fielding is scheduled to continue beyond FY11. The program is funded for a total of 2,344,168 masks to support the Army, Air Force, Coast Guard, Marine Corps and Navy. The XM50 mask replaces the existing M40 individual mask, and the XM51

replaces the M42 crew member mask. The older masks are at the end of their service life.

JOINT BIOLOGICAL AGENT IDENTIFICATION AND DIAGNOSTICS SYSTEM (JBAIDS)

The JBAIDS program is DoD's initial effort to develop and field a common medical test equipment platform amongst all the Services. JBAIDS is an evolutionary, three-block, reusable, portable and modifiable biological agent identification and diagnostic system capable of simultaneous reliable identification of multiple biological agents of operational concern and other pathogens of clinical significance. JBAIDS Block I tests a variety of environmental samples and clinical specimens for non-diagnostic purposes, and performs confirmatory testing of samples collected by existing and future biological detection systems. Block II focuses on the militarization and hardening of critical toxin identification technologies based on a COTS/NDI candidate system. JBAIDS Block III is planned to be a handheld, FDA-approved device capable of providing the full range of biological agent identification and diagnostics.

Program Status. Block II development is scheduled for FY07.

NATIONAL GUARD WEAPONS OF MASS DESTRUCTION CIVIL SUPPORT TEAM (WMD-CST) UNIFIED COMMAND SUITE (UCS)

The UCS provides the WMD-CST with mission essential C4 support. The UCS capability includes state-of-the-art radio, and satellite and cellular communications subsystems that will provide dedicated LOS and NLOS secure and non-secure intra-team and intra-vehicular voice and data reachback. The UCS provides voice, data, and video reachback capabilities to WMD-CST operations centers, incident CPs, and the various military forces, federal, state, and local law enforcement and emergency service units that support domestic incident responses. These communications subsystems operate in handheld, base station and vehicle configurations capable of interoperating with military and commercial radio communications systems in various terrain and urban environments.

Program Status. In production and fielded with Army National Guard WMD-CSTs throughout the U.S. This system is currently not overseas deployable.

NATIONAL GUARD WEAPONS OF MASS DESTRUCTION CIVIL SUPPORT TEAM (WMD-CST) ANALYTICAL LABORATORY SUITE (ALS)

ALS provides the WMD-CST with a mobile laboratory capability to analyze samples on-site in support to the first responder incident commander. The ALS is a mobile analytical laboratory capable of providing the CST a presumptive analysis for the presence of chemical, biological, or radiological contamination. The ALS is a System Enhancement Program to replace the current Mobile Analytical Laboratory System and interim Dismounted Analytical Platform. The ALS provides advanced technologies with enhanced sensitivity and selectivity in the detection and identification of chemical warfare agents and toxic industrial materials.

Program Status. In production and fielded with Army National Guard WMD-CSTs throughout the U.S. This system is currently not overseas deployable.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR, EXPLOSIVE (CBRNE) INSTALLATION PROTECTION PROGRAM (IPP)

This program will provide installations with an integrated and effective CBRNE installation protection capability consisting of CBRNE detection, identification, warning, protection, decontamination, information management, medical protection, surveillance and response. The program objective is to improve the installation's emergency first responder capability and leverage existing physical security, logistics, sustainment, maintenance and C2 capabilities to maximize effectiveness while reducing the resource impact (time, funding, and personnel) on the installation.

Program Status. Selected installations were fielded their initial CBRNE response capability sets in FY05. The remainder of the initial 62 installations will be equipped through FY11. This program currently is funded to address 62 of 187 Army bases. The systems provided to the installations are not deployable.

Appendix 3: Focused Logistics

Focused Logistics (FL) provides the most effective and efficient full-spectrum logistics support to the Joint warfighter. FL ensures we provide the Joint force with the right personnel, equipment, supplies and services in the right place, at the right time, in the right quantities across the full range of military operations. The Army Modernization Plan includes critical programs to achieve our three major thrusts of achieving visibility of the entire logistics domain including requirements, resources and priorities; responding with speed and precision to meet the needs of the combatant commander; and ensuring logistics unity of effort across the Joint Operational Area (JOA). This appendix provides a brief discussion of the Army's FL capabilities that support required Joint force capabilities and the key materiel programs associated with these capabilities.

IMPROVING UNITY OF EFFORT

The Army must ensure unity of effort in planning and executing logistics operations across the JOA to achieve logistics unity of effort through theater sustainment commands (TSCs) and a convergent logistics C2 structure that links all Army theater logistics units and activities to a single command and control element that is also joint-capable. The Army has transformed its logistics forces to provide TSCs that are regionally focused and globally employable and that have deployable CPs capable of rapidly establishing and sustaining operations. These TSCs have reachback capability to the CONUS sustaining base through the Army Sustainment Command, a major subordinate command of the Army Materiel Command. These interconnected commands, closely linked with our Joint and strategic logistics partners, will allow the ability to rapidly open a theater, effectively coordinate logistics efforts to support the Joint force commander, and maximize efforts of the end-to-end logistics domain to sustain operations.

The Army has resourced modular BCTs to be self-sustaining for expeditionary operations. Above the BCT level, sustainment brigades and their subordinate modular units provide the capabilities to support units within their area of operations for extended campaigns. Providing the right balance between brigade Combat Service Support (CSS) and echelon-above-brigade CSS will ensure an expeditionary Army with campaign qualities that operates as a critical part of the Joint force.

Modular units will employ advanced technologies, including an extensive array of networked ground, air and space sensors to provide the commander an unprecedented logistics operating picture. Modular Brigade Enhancement activities can assist in spinning out advanced technologies into current and future weapon systems. In the future, knowledge-based applications, shared across the enterprise and powered by the Army's LandWarNet, will enable logistics decision-makers to have visibility of actual and planned force deployment and sustainment requirements. This future COP will provide near real-time status and locations of inventories to effect combat power and will enable the commander to develop and evaluate effective offensive and defensive courses of action in line with logistical parameters.

The COP will allow Joint force leaders to understand current logistics postures and supplies and provide them the ability to validate requirements and then influence their subsequent sourcing, movement planning and movement, throughout the enterprise. Leaders at all levels—strategic, operational, and tactical—will use the COP to analyze and share assessments through a collaborative planning process enabled by these future information technologies. This is made possible through a real-time, web-based information system providing accurate, actionable visibility as part of a common logistic operating environment (CLOE), effectively

linking the operator and the logistician across Joint forces and from foxhole to the strategic level. Key support functions include deployment distribution, global mobility, ability to sustain the force and medical support to combat forces.

Future Force commanders will be able to leverage this information to enhance collaborative planning, reduce the decision cycle, seize the initiative, and build combat power prior to, during and after operations. To achieve the required unity of effort and domain-wide visibility, the Army will migrate 16 current logistics standard Army management information systems (STAMIS) into GCSS-Army to create a single logistics integrated enterprise as shown in Figure D-1.

These systems are used in every unit in the Army to provide maintenance, supply, ammunition, property, fleet and tactical financial operations and management. By transforming these systems into a single, integrated enterprise that incorporates interoperable Joint capabilities and best business processes, we will increase unity of effort in planning and executing Army and Joint operations.

The vision for logistics automation transformation is a Single Army Enterprise System (SALE) based on commercial best practices. The strategy being executed collapses our current STAMIS, while concurrently introducing new business systems and capabilities. Army G-4 will use the Army Integrated Logistics Architecture (AILA) as the overarching logistics architecture. AILA informs, guides, and supports decisions for SALE and assists the Army logistics community in achieving integration and interoperability.

As this migration is integrated, the Army must continue to maintain and upgrade its current

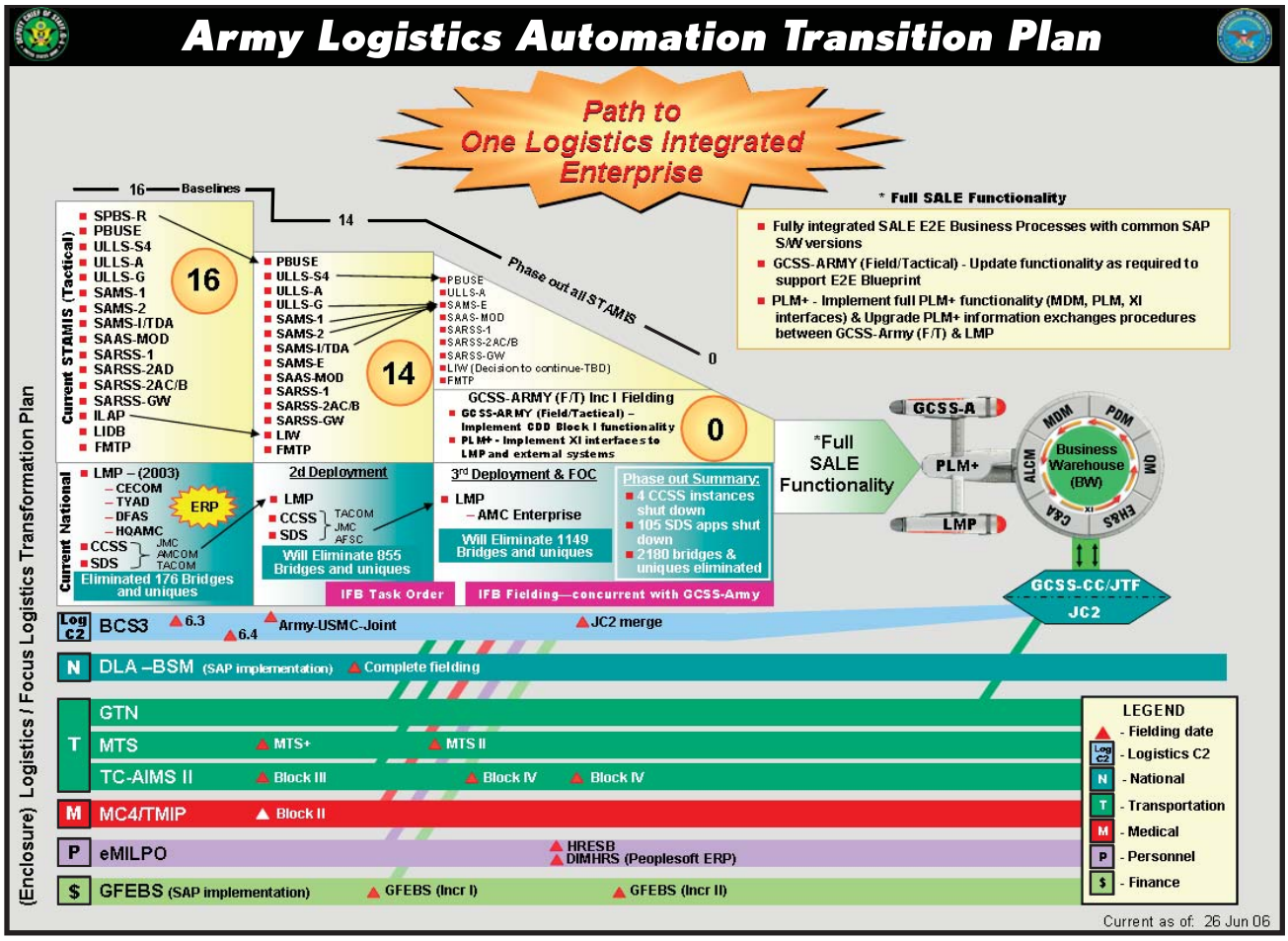


Figure D-1 Army Logistics Automation Transition Plan

systems until the enterprise system, GCSS-Army, is fielded. BCS3 which is embedded within ABCS will continue to be fielded. ABCS/BCS3 is interoperable with both Joint and multinational systems and has improved the connectivity between tactical, operational, and strategic units and provides a logistical COP to all commanders. The Army also continues to field the Medical Communications for Combat Casualty Care (MC4)/Theater Medical Information Program (TMIP) applications that link the combat medic to field health care facilities.

In the far-term, development of decision support capabilities that anticipate logistics requirements and forecast operational solutions will support shortened decision cycles, preemptive intervention, and mission success. Considering the technical and operational context of the Future Force, the Army must continue to investigate relevant scientific and technological information in the areas of predictive analysis, logistics planning, decision support, and knowledge management in order to provide an azimuth for Army and Joint logistics community efforts. In particular, the Army logistics community should aggressively seek opportunities to collaborate with the Research Testing Development and Evaluation (RDT&E) community, providing input for investment decisions and endorsements of R&D efforts.

DISCUSSION OF KEY UNITY OF EFFORT PROGRAMS

GLOBAL COMBAT SUPPORT SYSTEM-ARMY (GCSS-ARMY)

GCSS-Army is the primary enabler of the Army's Combat Support Combat Service Support (CS/CSS) transformation. GCSS-Army streamlines CS/CSS tasks and provides a web-based, Enterprise Resource Planning solution replacing all existing stovepiped logistics STAMIS. GCSS-Army provides CSS information and field-service management at the Army's tactical and operational levels. GCSS-Army has two components—a functional component for deployable forces called GCSS-Army Field Tactical (GCSS-Army (F/T); and a technology-enabler component called Product Life-cycle Management Plus (GCSS-Army (PLM+). GCSS-Army (F/T) and GCSS-Army (PLM+), coupled with the Logistics Modernization Program comprise the three key components of the SALE architecture.

Program Status. GCSS-Army currently is in the technology development phase,is undergoing efforts to achieve a MS B acquisition decision, and anticipates completing this process in FY07. The program is fully funded and is keeping pace with the current GCSS-A transformation plan.

BATTLE COMMAND SUSTAINMENT SUPPORT SYSTEM 6.4 (BCS3)

BCS3 is a decision-support system embedded within the overall ABCS that assists commanders and staffs in planning and executing CSS operations. It is key to building and sustaining combat power in a continuous operational environment over extended distances. BCS3 will rapidly collect and disseminate critical logistics information. BCS3 is the CSS component of the ABCS, as well as a key logistics enabler in the Army's transformation efforts. It will be interoperable with GCSS-Army and is comprised of computer units, common operating software and unique software. BCS3 is deployable in a laptop configuration, with or without storage/transit cases, and in Standardized Integrated Command Post System (SICPS) configurations.

Program Status. BCS3 is being fielded consistent with Army priorities for deployed, deploying, and transforming units, and is in alignment with ABCS 6.4. AC fielding will be complete by the end of FY07. Fielding to the remaining Army components will be completed in FY10.

MEDICAL COMMUNICATIONS FOR COMBAT CASUALTY CARE (MC4) SYSTEM

The MC4 system is a Joint theater-level, automated CHS system for tactical medical forces that enhances medical Situational Awareness for the operational commander and enables a comprehensive, life-long electronic medical record for all Service members. Employing the Joint TMIP software, it will receive, store, process, transmit and report medical C2,

medical surveillance, casualty movement/tracking, medical treatment, medical situational awareness, and medical logistics data across all levels of care. The MC4 system is a fully operational, standard system that operates on COTS hardware that provides a streamlined personnel deployment system using digital medical information.

Program Status. To date, the program has fielded over 15,000 systems to various priority units. FY07 fielding continues to modularized ARNG BCTs and SOF units, including Ranger battalions and Special Forces Groups. FY08-13 planned fieldings will complete the BCT converted units and begin the echelons above brigade medical units.

ACHIEVING DOMAIN-WIDE VISIBILITY

Army logisticians will provide certainty to the supported Joint force commander—certainty that forces will receive the right support, at the right place, at the right time, across the full spectrum of military operations. The vision is that warfighters and logisticians will have total situational awareness of all aspects of logistics, from laboratory to factory to foxhole and back.

Domain-wide visibility is also key to reducing stockpiles in theater through sustained velocity management and real-time tracking of supplies and equipment. Future Combat Force units will "see first" by identifying current status of equipment readiness, anticipating sustainment requirements, and ensuring the flow of logistics to enhance combat power. The Army's programs to achieve unity of effort are also integral to improving domain-wide visibility. GCSS-A, BCS3, and Transportation Coordinators' Automated Information for Movement System II (TC-AIMS II) will enhance deployment and sustainment of forces by facilitating exchange of data between Army units and the combatant commanders, thus providing improved visibility and enabling faster response to unforeseen circumstances.

Today, sensors (RF tags and interrogators) coupled with the MTS have enabled a clear picture of the movement of supplies to the warfighter. PBUSE and SAMS-E remain critical to visibility, control and maintenance of Army equipment. The Army will continue efforts to more effectively connect its logisticians and further improve visibility over requirements, resources and priorities.

DISCUSSION OF KEY DOMAIN-WIDE VISIBILITY PROGRAMS

MOVEMENT TRACKING SYSTEM (MTS)

MTS is a satellite-based tracking/communications system consisting of mobile units, transceivers, control stations, GPS, common operating software and MTS-unique software. MTS provides continuous CS/CSS asset visibility and situational awareness for the joint logistics corporate enterprise, enables expeditionary logistics, and is key in achieving the sense-and-respond capabilities required to support net-centric warfare operations. MTS assists CS/CSS unit commanders in planning and executing operations with the capability to identify and track positions, monitor progress, and communicate with tactical wheeled vehicles supporting CS/CSS operations, essentially anywhere in the world. MTS supports BFT by passing position location information into the logistics COP via BCS3.

Program Status. MTS system will continue fielding with phased upgrades to include embedded GPS, integrated radio frequency identification and anti-spoofing technology. The focus for fielding in FY07 will be continued support to deploying units as well as fielding in USAREUR and Korea. The Army National Guard also will complete fielding of over 2,700 MTS systems that began in FY06. The USAR is also scheduled to receive approximately 322 systems in FY07.

PROPERTY BOOK UNIT SUPPLY ENHANCED (PBUSE)

PBUSE is the Army's web-based property accountability system that replaces the Standard Property Book System-Redesign and Unit Level Supply System-S4 to network and simplify accounting for property. PBUSE provides centralized asset accountability and complies with the Chief Financial Officer Federal Financial

Management Improvement Act, and is a key enabler for converting the Army to modular formations, equipping the force, and ensuring end-to-end visibility and property accountability. Army-wide improvements include an enterprise assets database, graphical user interfaces and process improvements to simplify lateral transfers. PBUSE enables the modular Army to transfer, task-organize, replenish, and account for property.

Program Status. The Army is fielding at 90 percent of the total requirement for PBUSE and is projected to complete Army-wide fielding by the end of FY07.

STANDARD ARMY MAINTENANCE SYSTEM (SAMS-E)

SAMS-E is the Army's web-enabled maintenance management system that replaces ULLS-G and three legacy echelons of SAMS to network and simplify maintenance management, enable two-level maintenance, and comply with DoD requirements for materiel condition status reporting. SAMS-E modernizes the Army's automated unit-level maintenance, repair parts supply, readiness reporting and automated dispatching. When linked via CSS, SATCOM SAMS-E eliminates the requirement for an inefficient "sneaker-net" and delivers repair parts in record time. SAMS-E also simplifies the means to task-organize units for support, provides orphaned unit maintenance, and serves as the key enabler for efficiently maintaining the force.

Program Status. The Army is currently fielded at 20 percent for SAMS-E and is projected to complete Army-wide fielding by FY09.

IMPROVING RAPID AND PRECISE RESPONSE

Logistics success in an expeditionary environment is measured in our ability to respond with speed and precision to operational needs of the Joint force. While depending on Joint force projection capabilities, the Army continues its own efforts to enhance deployment capability and responsiveness while reducing deployment requirements. Forward-deployed forces, pre-positioned stocks, regional bases/strategic flotillas and facilities, assured access through standing agreements with allies and other nations, regional engagement by special operations and conventional forces, and multinational exercises are all instrumental in shaping a position of strength in a given region.

FORCE PROJECTION AND SUSTAINMENT LIFT CAPABILITIES

Previous wargames and analysis efforts have shown that advanced strategic and intra-theater air- and sealift platforms are required to support/enable future warfighting concepts. Future lift platforms must provide enhanced capabilities to meet the warfighter's force projection, distribution and sustainment requirements.

SEALIFT

Most current DoD sealift platforms are deep-draft vessels (> 30 ft) that require commercial deep-draft ports to load and offload unit equipment (roll-on/roll-off). Current DoD and commercial vessels which move either containerized equipment or sustainment stocks also require developed infrastructure (cranes, piers, staging yards) of major commercial ports to support vessel loading and offloading operations. The availability of such ports is limited, and they are often located in the commercial and population centers of most countries. These major seaports of entry represent

highly predictable and limited locations for DoD force projection and sustainment operations, rendering our operations vulnerable. Advanced Joint sealift capabilities enable us to rapidly project forces to multiple smaller, more austere (less infrastructure) ports of entry and are critical to support efforts required to defeat expected anti-access and area-denial efforts in the future. Inter- and intra-theater sealift vessels that combine the attributes of high-speed, shallow draft and self-employable cargo load and offload systems can leverage a far larger number of ports beyond the limited number (and geographically located) large commercial ports of the world. Advanced sealift platforms support the concept of multiple, parallel seaports of debarkation, fundamental in overcoming anti-access challenges.

AIRLIFT

Existing strategic air platforms such as the C-5 Galaxy and C-17 can carry enormous loads, but are dependent on world-class airports for both embarkation and debarkation. The C-17 provides the only capability today of bypassing these major chokepoints from appreciable distances while maximizing load capacities. Even so, the C-17 is still constrained to at least a 3,000-ft runway and, in many cases (weather, terrain and environment dependent) may require longer runways. In its intra-theater role, the C-130, is hampered by significant payload, altitude, and range limitations and cannot be refueled in air. These capability limitations not only severely constrain our ability to execute assured access strategies, they demand a nearby intermediate staging base to transload equipment, personnel, and sustainment from inter- to intra-theater lift platforms and to provide a refueling base for intra-theater platforms. None of the airlift platforms are suitable for air sustainment, nor can they support rapid shift of maneuver forces and sustainment across the breadth and depth of the battlespace.

To overcome the limitations of these strategic air platforms, larger-capacity Super Short Takeoff and Landing (SSTOL) and/or Heavy Lift Vertical Takeoff and Landing (HLVTOL) platforms are required in substantial quantities for Mounted Vertical Maneuver, transportation of supplies to employed BCTs and combat aviation brigades, and for efficient, long-range air movement of the future.

Whether the goals encompass operational maneuver from strategic distances, use of multiple simultaneous austere points of entry, vertical maneuver and envelopment, dominant maneuver, precision engagement and focused logistics, SSTOL and HLVTOL technology solutions are needed sooner rather than later. Funding the S&T and procurement required to bring advanced lift capabilities to the Joint force is a Joint challenge. The Army alone cannot develop, procure and field such systems due to both budgetary and regulatory constraints, and encourages Joint S&T emphasis on the following efforts:

Strategic High-Speed Sealift (SHSS). An SHSS is a strategic sealift ship (CONUS to JOA) that can deliver troops, equipment and sustainment together in sufficient size and at considerable speed to provide immediate combat power to the Joint force commander. Because it has been optimized (draft, length, beam) to operate in ports other than the world's limited deep-draft commercial ports, it can project DoD units (equipment, personnel and initial sustainment stocks) in a far greater number of locations than current DoD and commercial sealift assets. With an onboard C4I suite, commanders can conduct en route planning, receive intelligence updates and integrate with the Joint force commander.

Super Short Takeoff and Landing (SSTOL) Aircraft. The SSTOL is a joint aircraft that can carry two FCS platforms 3,500 miles. It can land on 750 ft of road or field in the JOA, which avoids fixed airfields and adds innumerable points of entry. It provides the Joint force commander the ability to achieve operational surprise.

Heavy Lift Vertical Takeoff and Landing (HLVTOL) Aircraft. The Army's Future Force capstone concept stipulates that although the self-deployment capabilities of the Future Modular Force are significant in terms of current fixed wing assets, it is the force's ability to conduct decisive maneuver that is most relevant to the Joint force. An HLVTOL is an aircraft with the ability to deliver an armored vehicle in the Stryker or Future Combat System class in full combat configuration to a combat radius of 250 nautical miles (nm) with an objective of 500nm (1,000nm objective range). An HLVTOL capability thus supports decisive maneuver and would provide the capability to precisely deliver a fully combat configured armored vehicle by air to a position of tactical advantage and let that vehicle directly and immediately move to the fight. The ability to vertically insert armored combat vehicles gives the Joint force unparalleled speed and agility. Generally independent of ground conditions, HLVTOL enables the Joint force commander to conduct vertical envelopment and vertical mounted maneuver while avoiding predictable, linear patterns of operation. It also offers significant benefits to both vertical, Joint logistics over-the-shore (JLOTS) operations and, also, to logistical support of widely dispersed ground combat units when LOC are either vulnerable or difficult. Current Aviation Applied Technology Directorate technical analysis is proving that an HLVTOL aircraft development is both feasible with modern technologies and technically achievable in the near to mid term.

SUSTAINMENT CAPABILITIES

To sustain warfighters, logisticians must be able to anticipate and confirm operational requirements and then provide the right capabilities at the optimum place and time. The new concept of support relies on synergies achieved by fielding not only materiel and technology solutions, but also organizational and educational changes. This operational transformation, combined with our institutional business process transformation and policy innovation, is the basis of the Army's logistics transformation.

DISCUSSION OF KEY RAPID AND PRECISE RESPONSE MATERIEL PROGRAMS

JOINT HIGH-SPEED VESSEL (JHSV)

The JHSV is an intra-theater lift platform that provides advanced capabilities for the operational maneuver of combat-ready units and sustainment to smaller theater ports or sheltered shoreline areas within a JOA. The JHSV program is based upon a high-speed (40+ knots), shallow-draft, sealift platform that will maximize current commercial high-speed ferry technology. The JHSV provides the capability to conduct operational maneuver and repositioning of intact unit sets while conducting en route mission planning and rehearsal. This intra-theater vessel provides the combatant commander with increased throughput, survivability, and responsiveness, and improved closure rates. It provides an alternative to intra-theater airlift within many theaters and allows the Joint force commander to rapidly insert combat forces into austere ports. JHSV would provide theater force projection and sustainment lift to deploying units arriving by strategic lift (air, sea) to a theater. The vessels would be utilized to move Army Pre-positioned Stocks (APS) located on land or afloat. JHSV supports traditional JLOTS and future sea-basing operations within an anti-access/access-denial environment. This transformation enabler helps deployment goals as well as achieve full distribution-based logistics.

Program Status. The Army and the Navy have combined requirements and merged the Army's Theater Support Vessel (TSV) and the Navy's High-Speed Intra-Theater Surface Connector programs. Although the Army initially determined a requirement for 24 vessels and a critical requirement for 12 vessels, a Joint requirements and solution set has not yet been determined. To ensure Joint interoperability, minimize redundant capabilities and gain economies of scale, the Army and Navy have signed a memorandum of agreement assigning the acquisition lead for the JHSV program to the Navy. Each department will source its Service-unique developmental costs and will separately fund vessels to meet their own

requirements. The Navy and Army are jointly sourcing RDTE 50/50. Cost for the first vessel is $210 million, and follow on vessels will cost $170 million (in FY08 dollars). The price does not include additional add-ons (C41, AT/FP, mounted command) of $10-20 million. The Army and Navy have initially programmed funding for a total of eight vessels (3 Navy, 5 Army) in FY07-11 FYDP. The lead vessel award is planned for FY08, and delivery is planned for FY10-11, followed by post-delivery tests in FY11-12. Follow-on vessels are planned for FY09-11 (vessels 2-4), FY10-12 (vessels 5-6), and FY11-13 (vessels 7-8).

JOINT PRECISION AIRDROP SYSTEMS (JPADS)

JPADS is a high-altitude-capable, autonomously operated precision airdrop system. The system consists of a family of different-sized airfoils, allowing airdrop of weight categories up to approximately 60,000 lbs. JPADS is not totally wind dependent and is releasable from altitudes up to approximately 25,000 ft mean sea level. Based on winds and release altitude, 35km standoff distances are also possible. Space-based GPS technology provides for aerial navigation and maneuverability throughout descent, steering into the wind as necessary, and permitting highly accurate ground touchdown locations. JPADS is a critical logistics transformation enabler that facilitates dedicated aerial sustainment and helps achieve full distribution-based logistics.

Program Status. MS B decision for the 2,000 lbs variant is scheduled for second quarter, FY07. The 10,000 lbs variant is currently an ACTD expected to transition to program management in FY07. The 30,000 lbs variant is expected transition to program management in FY08. The 60,000 lbs variant is currently unfunded.

ADVANCED AVIATION FORWARD AREA REFUELING SYSTEM (AAFARS)

AAFARS M100A1 is a modular, four-point refueling system. The principal components are engine, pump, filter and control modules, along with hoses, nozzles, couplings, defueling pump, fuel blivets (500 gallon drums), fire-suppression equipment, fuel spill containment berms, nozzles and fuel test kit. AAFARS is transported inter-theater in three specialized shipping containers.

Program Status. There have been 244 systems fielded. Current production and fielding schedules is four per month thru August 2009.

PETROLEUM QUALITY ANALYSIS SYSTEM (PQAS)

PQAS is a complete petroleum quality surveillance (QS) laboratory capable of conducting B-level testing in accordance with MIL-STD-3004 on kerosene-based (e.g., jet propellant (JP)-5, JP-8, Jet A, Jet A-1) and diesel military mobility fuels.

Program Status. PQAS is being redesigned to meet the Full Armor solution with system integration of the HMMWV Shelter Based Laboratory into the FMTV International Standardization Organization (ISO) Shelter Based Laboratory. The program received the initial 20 FMTV long wheel base M1085A1 thru the Data Interchange Program in November 2006. The selected for use in the new design is the Standard Automotive Tool Set shelter used by PM-SKOT.

TACTICAL ELECTRIC POWER (TEP)

TEPs are all-mobile, engine-driven, electric power generating sources, 920kW and smaller, which are skid mounted, trailer mounted or man portable. TEPs are capable of independently producing electric power when operating on diesel, JP-8 or other fuel sources. Included are follow-on power sources such as fuel cells and thermoelectric devices. These mobile, tactical generators provide quality power to operate DoD systems away from a fixed power grid and are found in nearly every organization in the Army. They directly support all field electrical systems such as C4ISR, medical, maintenance, fire direction and controls, target acquisition, life support, sustainment and illumination.

Program Status. TEP Tactical Quiet Generators (TQGs) are currently in production and being fielded. The next generation of TEP generators, the Advanced Medium Mobile Power Sources (AMMPS) (5-60kW), reached MS B in November 2003 and begins production in FY09. To date, 75 percent of the older MILSTD generators have been replaced by TQGs and 17,000 remain to be replaced by TQGs and/or AMMPS. Current FY07 fielding strategy is to support procurement to fill critical shortages for deploying units. POM 08-13 funding supports procurement of over 30,000 generators and Power Distribution Systems Electrical. Funding will modernize 84 percent of all Army Component's power generation requirements.

STANDARD AUTOMOTIVE TOOL SET (SATS)

The SATS system is a base tool set of the most frequently required automotive maintenance tools that can be augmented by modular packages that are tailorable to unit mission requirements and organizational design. SATS will eliminate obsolete tools, eliminate unneeded redundancy and inefficient tool proliferation, increase tool quality, improve transportability and improve tool accountability. The most significant advantage gained through use of SATS is its impact on the logistics footprint. This is done through standardization and modernization, which eliminates the need for four tactical-wheeled vehicles and trailers.

SATS is a modular, flexible, standardized automotive maintenance shop system that will replace the most numerous types of field level shop sets. SATS enables a modular, expeditionary, campaign-quality force and supports the Army maintenance transformation to a two-level system. The SATS consists of a transportable, International Standardization Organization (ISO) 8x8x20 container with an integrated government-furnished, electric power generator and Environmental Control Unit. The container includes secure storage space for a complete base set of COTS and government-furnished, industrial-quality tools and equipment needed to perform field-level maintenance of military vehicles and ground-support equipment.

Program Status. Full Rate Production will be reached in FY07 as a result of FY07 Title IX Supplemental funding procuring a total of 91. SATS is programmed for fielding FY08-13 with 97 deliveries in FY08, 161 in FY09, 111 in FY10, 140 in FY11, 485 in FY12, and 77 in FY13.

FAMILY OF MEDIUM TACTICAL VEHICLES (FMTV)

The FMTV is built around a common chassis and drive train, featuring over 80 percent commonality of parts and components between models and weight classes. Operating worldwide in all weather and terrain conditions, the FMTV provides unit mobility, re-supply and transportation at all organizational levels. It serves as the weapon systems platform for HIMARS and the support vehicle for Patriot. FMTV enhances crew survivability through use of hardened cabs, three-point seat belts, central tire inflation and machine gun ring-mount capability. It provides enhanced tactical mobility and is strategically deployable in C-5, C-17, and C-130 aircraft. FMTV reduces the Army's logistics footprint by providing commonality of parts and components, reducing maintenance downtime, and lowering operation and support costs that older trucks require.

Program Status. FMTV is in full production with over 27,000 trucks and 4,600 trailers fielded to date. A competitive requirements contract will be awarded starting in FY08. The new contract will include two new models—the Expansible Van and the 10T Dump Truck. Another new variant, the FMTV-Load Handling System, is expected to be fielded in late-2007, initially to medical units. Current fielding supports modular transformation and modernization of infantry, heavy, Stryker, sustainment and Fires brigade teams.

HIGH-MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV)

HMMWV is a light, highly mobile, diesel-powered, four-wheel-drive vehicle with common chassis. Using common components and kits, it can be configured as a troop, armament, TOW or shelter carrier or ambulance. It is a multi-Service program that also provides vehicles that satisfy USMC, USN, USAF and foreign military sales requirements. When armor is added, the M1151 (designated M1151A1), has up-armored HMMWV (UAH)-like protection with a greater payload and incorporates operational lessons learned from OEF and OIF. An enhanced troop, cargo, shelter carrier M1152A1 entered production in February 2006. The useful life of existing HMMWVs is being extended through an ongoing recapitalization program.

Intended to replace the High Mobility Multi-purpose Wheeled Vehicle, the Joint Light Tactical Vehicle (JLTV) is being developed as a Joint system between the Army and Marine Corps. The JLTV concept is based on a Family of Vehicles (FoV) that will provide greater force protection than the Up Armored HMMWV using scalable armor, increased mobility to enable operations across the full spectrum of terrain, transportability by a range of lift assets, including rotary wing aircraft, and networking for improved Battlespace Awareness and Command and Control. JLTV will also reduce sustainment costs through commonality of replacement spare and repair parts at the sub-assembly and component level, onboard and exportable power, and reduced fuel consumption.

Unlike predecessor vehicles of its weight class, the JLTV fleet will be developed with a compatible trailer system required to operate throughout all mission profiles. The JLTV family will incorporate open-systems architectures for backward compatibility with trailer equipment, and shelters currently existing in the DoD inventory to complement the JLTV prime mover throughout the various JLTV mission profiles.

Program Status. Current planning envisions a FoV approach (with companion trailers), with Increment 1 planned for production beginning FY12, and Increment 2 beginning FY16. If design solutions can accommodate Increment 2 systems mission accomplishment on Increment 1 platforms, the Increment definition and corresponding production entry may change. The Increment 1 schedule may be accelerated based on vehicles meeting threshold requirements and available funding.

HEAVY EXPANDED MOBILITY TACTICAL TRUCK (HEMTT)

The HEMTT family of vehicles provides all-weather, rapidly deployable transport capabilities for re-supply of combat vehicles and weapon systems. There are six primary variants of the HEMTT series trucks: M977/M985 cargo truck with Material Handling Crane, M978 2,500-gal fuel tanker, M984 wrecker, M983 tractor, the M1120 HEMTT-LHS. A self-recovery winch is also available on certain models. HEMTT-LHS provides the Soldier with an efficient and economical forward area distribution system. The HEMTT A4 (Product Improvement Program)/Long-Term Armor Strategy will be in full production in 2008-2009 and will consist of a modern power train, air-ride suspension, updated electrical system, anti-lock brakes, an traction control, common cab with PLS, and A kit and B kit armor. HEMTT series trucks were built for cross-country missions carrying payloads up to 13 tons, and are designated an FCS-complementary system and a key enabler to achieving a distribution-based logistics system.

Program Status. The M1075 PLS Truck, M978 Tanker, M984 Wrecker, and M1120 LHS Truck are currently in production. The FY07-13 fielding schedule includes SBCTs 4-7, modular infantry and heavy BCTs, sustainment and fires brigades and OIF combat-loss replacements. COMPO 3 Reserves requirements include vehicles for 162/474/164 sustainment brigades, 263 AAMDC, 16/35 engineer brigade as will as COMPO 2 Army National Guard 371/67/38/40/369 sustainment brigades.

PALLETIZED LOAD SYSTEM (PLS)

PLS is composed of a prime mover truck (16.5 ton payload) with integral self-loading and unloading transport capability, a 16.5-ton payload trailer, and demountable cargo beds (flat racks). The vehicle can also be equipped with MHE and/or winch. PLS is a key transportation component of the ammunition distribution system and provides long-range and local hauling, and unit re-supply of ammunition.

PLS can transport multiple configurations of cargo using a variety of flatracks, which are demountable cargo beds that come in three types: the "A" frame (M1077), the Intermodal Flat rack (M-1), and the Container Roll-in/Out Platform (CROP) (M-3). The PLS lift system can pick up 36,250 lbs at the lift hook. The M1077 basic flat rack weighs 3,250 lbs, which allows a payload of 16.5 ston. The M-1, which is ISO intermodal, weighs approximately 7,800 lbs and allows a payload of 14.25 stons for PLS and a 15.35 ston payload for intermodal. The CROP weighs less than 4,000 lbs and has a payload of 16.13 stons (36,250-4,000 = 32,250 lbs). The M1077 and M1077A1 are sideless flat racks used to transport pallets of ammunition and other classes of supplies. The M3 Container Roll-in/Out Platform (CROP) is a flat rack that fits inside a 20 ft ISO container. The M1077 flat rack is also incorporated with the FRS to allow it to be transported by the HEMTT PLS and LHS Trucks. The M1 flat rack carries identical classes of supplies and are used in support of engineer systems. It is ISO/Convention for Safe Containers (CSC)-certified and suitable for intermodal transport, including transport on container ships. Ammunition can be loaded on the M1 at depots, transported via container ship to theater, picked up by the PLS truck and carried forward without the use of any materiel-handling equipment.

Program Status. The PLS Block 1 (Product Improvement Program) will be in full production in 2008 and will include a modern power train, independent front suspension, updated electrical system, ABS & traction control, climate control, and a common cab w/HEMTT A4 & LTAS compliant. The PLS M3A1 CROP currently is in production, whereas the M1077 and M1 flatracks are no longer in production. Note, the M1077 flatracks are incorporated into the FRS and the M1 flatracks are used in support of engineer systems. FY07-13 fielding schedule includes all engineer mission modules, APS and OIF combat-loss replacements. Funding supports Army National Guard (COMPO 2) requirements for the 371/38/67/40 369/162/474 Sustainment Brigades.

CONTAINERIZED KITCHEN (CK)

CK integrates standard and commercial kitchen equipment into an expandable 8x8x20-ft ISO container. CK has onboard refrigeration and uses the improved modern burner unit; it has a running water system and the interior is environmentally controlled. CK can feed three meals a day to 800 Soldiers. Its efficiencies over the Mobile Kitchen Trailers include overall decreased footprint and manpower requirements.

Program Status. More than 300 CK systems have been produced and fielded and have been in continuous production since FY02. Production continues at the rate of four per month from FY07 through POM's end.

UNIT WATER POD SYSTEM (CAMEL)

The Camel system consists of an 800-900 gallon storage capacity tank, heater/chiller unit, government-furnished M1095 medium tactical vehicle trailer, and contractor developed components mounted to or carried by the trailer. Under the SBCT concept, Camel will provide a maneuver company operating in a temperate environment two or more days of supply of water at a minimum sustaining consumption rate. It will have provisions for at least six retail dispensing points, and be fully capable of stand-alone operation. Camel will be capable of transporting both full and partial loads of water by C-130 and

larger aircraft, external-lift helicopter, and low-velocity, air-droppable means. Camel replaces the M107, M149 and M1112 series water trailers.

Program Status. Four prototypes have been procured with Product Qualification Testing scheduled to begin early 2007, with scheduled completion in June. Unit fielding is projected to begin in fourth quarter, FY07.

LOAD HANDLING SYSTEM (LHS) COMPATIBLE WATER TANK RACK SYSTEM (HIPPO)

Hippo consists of a 2,000-gal, ISO-framed, potable water tank rack. Hippo has an organic 125-GPM water pump, filling stand, 70-ft hose reel for both bulk suction and discharge and retail distribution. Hippo will enhance water distribution by providing one system that enables both hard wall bulk water transportation and unit retail water support. It will allow for water transport directly from water purification points to supported maneuver elements and can be used as a water distribution point.

Program Status. Hippo will replace the Semi-trailer Mounted Fabric Tank and the majority of the Forward Area Water Point Supply System. Fielding of the Hippo is begins in first quarter, FY07.

1,500-GPH TACTICAL WATER PURIFICATION SYSTEM (TWPS)

Tactical Water Purification System supports Army's mission to provide life and mission sustaining water to front line and remote units in tactical environments. Capable of supplying 1,500 GPH of potable water for division and brigade ground units within remote areas. In addition, it provides quality water support to civilian agencies or host nations for disaster relief, humanitarian efforts and peace keeping missions.

Program Status. The Modular Requirement is 221 systems. All units should be fully fielded by FY09.

CONTAINER/MATERIAL HANDLING EQUIPMENT (C/MHE)

C/MHE includes all container and material handling equipment required to support the deployment of unit equipment and the distribution of sustainment items. The primary tactical C/MHE includes the Rough Terrain Container Handler (RTCH) and the All-Terrain Lifter Army System (ATLAS). The RTCH is the primary capability for handling 20- and 40-ft-long containers weighing up to 53,000 lbs. RTCH is deployable by air, operates on all types of terrain, and is capable of stacking containers up to three high. ATLAS has a 10,000-lb capacity and is capable of handling fully loaded 463L Air Force pallets, has a variable reach boom for removing items from 20-ft containers, and is capable of deploying by air.

Program Status. RTCH program was terminated in FY04 with 346 of the 627 (AAO) systems fielded. Production for Army requirements will restart again in FY08 and continue through FY12, and reach approximately 85 percent of the AAO. The initial contract production for ATLAS I ended in FY05 with 1,809 of 2,500 (AAO) systems fielded. Production of the ATLAS I and a follow-on production contract for an upgraded ATLAS II model will begin in March of FY07. Funding currently is provided through FY10 that will procure additional systems to reach the entire AAO.

NEXT GENERATION AUTOMATIC TEST SYSTEM (NGATS)

NGATS will consolidate the Army's Off-Platform automatic testing requirements currently being done with three systems. NGATS will be a reconfigurable ATS housed in an ISO Shelter and be transported by a HEMTT. NGATS will be 100 percent compatible for use with all Test Program Sets currently employed by Army off-platform automatic test equipment. It will have full sustainment level diagnostic maintenance capability on the full spectrum of current and future Army weapon systems. A key feature of NGATS is that it will use Joint service developed test technologies and move DoD closer to its stated

goal of a common ATS architecture capable of cross-service weapons system testing.

Program Status. NGATS is currently in the RDT&E phase. Developmental testing is to begin in mid-FY07. Basis of issue will be in accordance with current Army doctrine to support the modular force. Production is currently scheduled to begin FY09.

MAINTENANCE SUPPORT DEVICE (MSD)

As the replacement for the Soldier Portable On-System Repair Tool, MSD is a lightweight, rugged, compact, man-portable general-purpose automatic tester used to verify the operational status of systems, both electronic and automotive, and to isolate faulty components for immediate replacement. MSD is also used as a software uploader/verifier to restore or provide new software to weapon systems, and supports testing requirements of current and FCS. The MSD is in wide use throughout the Army's ground combat and CSS vehicle, as well as aviation fleets.

Program Status. MSD (V2) is currently being fielded. A recent change in the basis of issue will provide the MSD to field-level maintainers at a ratio of 1:3 per maintainer occupational skill. MSD AAO is 35,000, of which 50 percent have been fielded/modernized with MSD/MSD-V2. No projected buy-out of MSD as it is a recurring modernization effort driven by the development of new weapons technology. Current platform runs on Windows XP based software maintaining operability with new FMTV production vehicles and Paladin upgrades. Expired MSD/SPORT platforms run on older versions of Microsoft Windows and are not compatible with new FMTV production vehicles and Paladin upgrades.

GENERAL PURPOSE ELECTRONIC TEST EQUIPMENT (GPETE)

GPETE products are COTS/NDI consisting of lightweight, man-portable general-purpose electronic test equipment used to test, maintain, and calibrate Army current and future systems. Examples include the oscilloscope, spectrum analyzer, data communication analyzer, frequency counter, multi-meter, signal generator, radio test sets, and radar test sets. GPETE modernization efforts continue to improve Army weapon system readiness, minimize GPETE proliferation and obsolescence, and reduce operations and support costs.

Program Status. Current GPETE modernization efforts include the AN/PRM-35 Radio Test Set, AN/GRM-123 Radio Test Set, SG-1364/U Signal Generator, and Function Generator. There are 36 other GPETE candidates for the Test Equipment Modernization program. These candidates will be sequentially modernized by priority as documented in the Army G-3 approved GPETE Identification and Replacement Prioritization List. Test Set, Radio is schedule for FY06-13, Signal Generator for FY06-10, Function Generator for FY07-09.

MAN-TRANSPORTABLE ROBOTIC SYSTEM (MTRS)

MTRS provides a two-person, portable, lightweight robotic system apable of being helicopter transported. Current operations have shown a need for smaller, portable robotic systems. Lack of this capability requires EOD and Combat Engineer Soldiers to physically approach explosive devices and manually perform reconnaissance and render safe procedures in confined spaces. Requirements for additional MTRS were initiated and validated in response to the increased threat and sophistication of potential threats.

Program Status. The new MTRS AAO of 461 incorporates additional requirements resulting from lessons learned in OIF and OEF. These requirements are included in the program plan through FY10 and are currently undergoing reform based on 06 approved FDU.

FORWARD REPAIR SYSTEM (FRS)

FRS is a high-mobility maintenance system designed to support forces in the battle area. FRS includes a crane and maintenance enclosure mounted

on a component flatrack. The crane has a 5.5-ton lift capacity with a 14-ft (4.3 m) radius capable of removing and replacing major components, including full-up powerpacks of all models of military vehicles. The maintenance enclosure includes a 35kW generator; air compressor; welding equipment including arc; and industrial-quality air and electrical power tools ranging from 3/8- to 1-in drive with associated tool cabinets.

Program Status. FRS is currently in full production and fielding. Projected procurement/fielding of AAO by FY11. FRS is projected to field for FY07-11 with deliveries of 297 in FY07, 300 in FY08, 294 in FY09, 298 in FY10, 216 in FY11, 485 in FY12, and 77 in FY13.

SHOP EQUIPMENT WELDING (SEW)

The Shop Equipment, Welding (SEW) is a trailer mounted self contained welding shop. Fabricated and integrated enclosure mounted on a Trailer; integrates COTS and NDI components to service tactical engineer and ordnance maintenance units in performing welding repairs. The SEW provides a full spectrum of welding capabilities through-out the battlefield and repairs may be performed in all weather, climatic and light conditions. The SEW provides significantly on-site welding capability with increased mobility and deployability. The SEW supports the only qualified welders in the Army, 44Bs and supports two level maintenance. The SEW provides capability to perform, Shielded Metal Arc Welding "STICK", Flux Cored Arc Welding, Gas Tungsten Arc Welding "TIG", and Air-Carbon Arc Cutting "Arc gouging", Oxy-fuel Gas Welding and Torch Brazing. The SEW also provides compressed air on demand, electrical power for lights and electric hand tools, and an illuminated work surface with a vise.

Program status. Program is currently in full rate production, the army acquisition objective (AAO) is 1,240. The program will reach AAO in FY08 or FY 09.

ASSURED MOBILITY CAPABILITIES

The Engineer Future Force will be organized, manned, equipped and trained to be more strategically responsive, deployable, agile, versatile, lethal, survivable and sustainable across the full spectrum of military operations. Future engineer force structure will be comprised of modular, scalable and flexible organizations for prompt and sustained land operations capable of quickly transitioning between changes in task, purpose and directions.

Assured mobility capabilities support force application by maneuver forces as well as focused logistics by sustainment forces. Current operations in OEF and OIF highlight the enduring importance of systems that provide ground forces the capability of detecting, defeating and emplacing minefields and other obstacle effects, allowing unparalleled freedom of maneuver and force sustainment. This capability is critical to gaining the positional advantage needed to retain the initiative and enhance joint precision fires as well as ensuring sustainment force movement remains effective across the distributed battlefield environment.

DISCUSSION OF KEY ASSURED MOBILITY MATERIEL PROGRAMS

AN/PSS-14 HANDHELD STANDOFF MINE DETECTION SYSTEM (HSTAMIDS)

The AN/PSS-14 is a handheld mine detector capable of detecting metallic and low-metallic AT and AP landmines. It combines ground penetrating radar, an advanced metal detector, and sophisticated aided target recognition to provide a robust probability of detection and reduced false alarm rate. AN/PSS-

14 is complemented by a training set that includes a Sweep Monitoring System and Training Target Set.

Program Status. AN/PSS-14 entered FRP in FY06. Systems are currently being fielded in support of OEF and OIF, with priority given to Engineer, EOD, and SOF units.

GROUND STAND-OFF MINEFIELD DETECTION SYSTEM (GSTAMIDS)

GSTAMIDS FCS is a time-phased developmental program designed to provide the warfighter a capability to execute on-route countermine missions for the FCS. GSTAMIDS FCS will be employed on an overpass-capable countermine Multifunctional Utility/Logistics and Equipment Vehicle (MULE) variant UGV. The system will employ future improvements that will automatically detect, mark and neutralize all metallic and nonmetallic AT mines.

Program Status. GSTAMIDS FCS currently is in SDD and preparing for fourth quarter, FY07 Preliminary Design Review. GSTAMIDS is planning for a Milestone C and production in FY12.

AIRBORNE SURVEILLANCE, TARGET ACQUISITION, AND MINEFIELD DETECTION SYSTEM (ASTAMIDS)

ASTAMIDS is an FCS Tier 1 Complementary Program. ASTAMIDS is an FCS Class IV Fire Scout UAV sensor payload that provides near-real time detection of surface and recently buried minefields and obstacles in day and night conditions. Minefield and Obstacle information is used to update the COP of the unit. ASTAMIDS also performs an FCS BCT Class IV Fire Scout UAV RSTA and Laser Designation mission and function in addition to its countermine mission.

Program Status. ASTAMIDS is in the SDD phase of acquisition. The program completed its Preliminary Design Review during April-May 2006. Contractor Functional and Qualification Testing is planned throughout FY07. An MS C/LRIP decision is planned during second quarter, FY09.

ROUTE CLEARANCE VEHICLES

Route Clearance Vehicles consist of a family of mine-protected vehicles employed by combat engineers in route clearance operations. The three vehicles include the Buffalo Mine Protected Clearance Vehicle (MPCV), the Interim Vehicle Mounted Mine Detector (IVMMD), and the Medium Mine Protected Vehicle (MMPV). The systems are employed within a route clearance team with 1-2 MMPVs serving as a command and control vehicle and providing local security to the team. IVMMD is then employed to detect the mine or IED hazards so that the MPCV can investigate suspicious items with its articulated arm. All three vehicles provide the crew protection from explosive blasts and small-arms fire, and each is designed for rapid repair after an explosive incident. All three vehicles are NDIs that have proven effective in war time operations.

Program Status. The Route Clearance Vehicles have been fielded in support of OEF and OIF. The MPCV and MMPV have AROC approved CPD and the IVMMD CPD is pending approval. MS C is expected in FY07 pending funding and completion of full material release actions.

INTELLIGENT MUNITIONS SYSTEM (IMS)

IMS first increment fulfils the requirement to develop and field to comply with National Landmine Policy by fielding a replacement capability for the existing family of non-self-destructing anti-tank landmines. IMS is a system of munitions, sensors and communication devices that can implement obstacle intent and attack targets, either autonomously or with MITL control. The fully networked munition allows for a scalable response and provides ultimate flexibility for hand or remote emplacement on the dynamic battlefield. IMS is a key capability in providing assured mobility by giving force commanders the freedom to maneuver where and when they want without regard to terrain, weather or other conditions and for force protection by providing early warning and action on a threat.

Program Status. IMS currently is in the SDD phase. Milestone C in FY08-09 and IOC is projected for FY10.

SPIDER (ANTI-PERSONNEL LAND MINE ALTERNATIVE (APL-A))

Spider will replace persistent (non-self destructing) AP landmines and is designed to address humanitarian concerns associated with persistent landmines and meet essential military requirements. Spider consists of three hardware components: a Remote Control Station (RCS) that provides a computer interface for operator control and alerts the operator of intrusions; a Repeater for extended communications; and Munition Control Units (MCU), each containing six individual grenades and sends alerts to and receives commands from the RCS. Spider minimizes risk to non-combatants while protecting friendly forces through MITL control and self-destruct/self-deactivation.

Program Status. Spider is currently in the LRIP phase and projected to reach FRP in FY09. Materiel Release is projected for FY09. FUE is scheduled FY09, with IOC FY09.

IMPROVED RIBBON BRIDGE (IRB)

The IRB, fielded to multi-role bridge companies (MRBC), provides a dependable roadway or raft capable of crossing assault vehicles or tactical vehicles over non-fordable wet gaps. This system is capable of a military load classification (MLC) of 100 wheeled and MLC 80 tracked. The bridge sections are transported by Common Bridge Transporters, which are modified HEMTT LHS providing enhanced, multipurpose transportation capabilities. Each MRBC will be capable of emplacing 210m of bridging. The system is external airlift transportable by CH-47 and CH-53 helicopters. The bridge bays are air transportable, partially disassembled, in C-130s. The IRB has enhanced capabilities of operation in swifter water speeds up to 10.3 ft per second and over 2.1m banks. It provides a 4.5m-wide roadway, improved hydrostatic capabilities and various other design improvements.

Program Status. This multi-year contract started in FY00, and will field 23 MRBCs with the IRB. Eleven units are fielded to date, with the remaining units to be fielded by FY11.

RAPIDLY EMPLACED BRIDGE SYSTEM (REBS)

REBS is a wheeled, vehicle-launched, bridge system providing a four-meter roadway width, MLC 30 tracked (T) and wheeled (W) normal and MLC 40(T) (W) gap crossing capability up to 13m. Transported on a Common Bridge Transporter, each SBCT will have four REBS. This system is transportable by C-130 aircraft. The assembled bridge is externally sling-lift-transportable by CH-47 and CH-53 helicopters. Two Soldiers can deploy the REBS in the daytime, within 10 minutes, with little or no site preparation.

Program Status. System completed operational test in FY05. 7 SBCTS scheduled to complete fielding by FY07.

DRY SUPPORT BRIDGE (DSB)

DSB is a modular bridge assigned to the MRBC that can span a 40m gap and can be emplaced in 90 minutes by eight Soldiers. One bridge set provides either a 40m or two 20m bridges. The bridge will cross MLC 96W/70T traffic and will allow crossing of a heavy-equipment transporter carrying a combat-loaded M1 Tank. DSB consists of a launcher permanently mounted on a PLS, three CBTs (for transport only, separately issued to unit) and four

PLS trailers that carry the modular components as palletized loads. A bridge set consists of six M1077 flat-rack loads of bridge components, one M1077 flat-rack load of launch beams and a launcher vehicle. To transport and launch one complete DSB system requires the launcher, three CBTs and four PLS trailers.

Program Status. A multi-year production APO of 92 systems. Fielding initiated FY03 final fielding programmed to be completed FY11.

TACTICAL WHEELED VEHICLE FORCE PROTECTION

The Army has initiated an aggressive approach to protect its tactical wheeled vehicles as an important part of the Army's responsibility to sustain the Joint force with equipment and to provide protection against an adversary. The highest priority is to provide such protection to our forces involved in ongoing operations in Iraq and Afghanistan, though integrated efforts will be both short and long term in their impact. The Army currently has two distinct levels of armor protection that are being provided to tactical wheeled vehicles. The first, level I, refers to fully integrated armor installed during production and retrofit. The second level II, includes officially approved and centrally manufactured add-on armor kits that can be installed on vehicles anywhere. Concurrently, the Army is assessing and testing other technological improvements to ensure that all tactical wheeled vehicles involved in operational missions are equipped with the best protection available.

Armoring of the Tactical Wheeled Vehicle (TWV) fleet has been an enormous effort for the Army since late 2003. This endeavor was challenging because it required the design, testing, production and installation of armor components on TWVs that were never designed to accept armor. In spite of the challenge, the Army met Theater requirements for Add-on Armor (AoA) kits by September 2006, with over 26,000 TWV outfitted. However, AoA kits were never envisioned as long-term armor solutions for TWV. The Army's improved armoring strategy for TWV consists of a combination of "A" and "B" armor kits. The "A" kit, manufactured into the vehicle, provides the framework upon which the armor "B" kit is mounted. The "B" kit can be installed or removed to meet mission requirements. In addition to protecting TWVs with AoA kits, the Army also is providing enhancements to the factory-installed armor on the M1114 and M1151 up-armored HMMWV. Started in early 2006, these fragmentation protection kits add armor to protect such areas as the door edge, rocker panel, front wheel wells, and doors. Protecting our Nation's military force with armored TWVs remains a high priority for Army leadership.

MINE RESISTANT AMBUSH PROTECTED (MRAP) VEHICLES

The Army and USMC are procuring Mine Resistant Ambush Protected (MRAP) vehicles to fill JUONS and ONS requirements from theater for better underbody protected vehicles. The MRAP family of vehicles will provide operating forces multiple, mission-role platforms capable of defeating and mitigating the effects of IEDs and other casualty-producing threats currently seen in Theater. Due to the potential increase in vehicle size and weight which may be necessary to defeat these threats, the MRAP vehicles may not be capable of executing all the mission requirements currently executed by up-armored HMMWVs. The Army, therefore, currently views the MRAP as an augmentation to the Theater HMMWV fleet, rather than as a replacement. There are three categories of MRAP:

CAT 1 comprises Mine Resistant Utility Vehicle/ Urban Combat Operations, and can accommodate six or more personnel.

CAT 2 comprises Multi-Mission (convoy escort, troop transport, ambulance, EOD, combat engineer), and can accommodate ten or more personnel.

CAT 3 comprises Mine/IED Clearance Operations (Buffalo), and can accommodate six or more personnel.

Program Status. A Joint Marine Corps/Army request for proposal was issued 9 November 2006 for up to 4,060 MRAP vehicles with award(s) granted 26 January 2007. Accelerated testing of candidate vehicles, which consist of Cougar, RG-33, and ASV type vehicles, from 9 vendors is ongoing at Aberdeen Test Center. Once test vehicles are proven to meet requirements, the Army will place production orders. Currently, the Army is expected to buy up to 2500 MRAP vehicles, with delivery to begin in 4thQ07.

In addition to the essential materiel solutions to these operational requirements today, the Army is also fully involved in pursuing non-materiel measures that can directly improve the sustainment and protection of the Joint force. These steps include the work of the JIEDD TF, which is working across the interagency and international spectrum on materiel and non-materiel solutions to defeat this threat. Tangible results include effective countermeasures, fielding systems that increase detection and enhance detonation, and training solutions that increase awareness and incorporate lessons learned. In the end, this is and will remain a high-priority task for the Army and one that is fully integrated into equipping and operational requirements and responses.

Appendix 4: Battlespace Awareness (BA)

Battlespace Awareness (BA) is the ability to sense, analyze, present, and understand the operational environment with its mix of friendly "blue" forces, enemy "red" forces and "green" nonaligned actors/noncombatants. All aspects must be oriented in the same "foundational" time and space portrayed within a highly detailed physical terrain "gray" construct that includes the impact of weather. The Human, Informational, and Physical (HIP) terrain must all be represented to enable a full understanding of the "complex battlespace environment."

Battlespace Awareness relies on the continuous collection, processing, fusion, analysis, and modeling of data from a large mix of highly responsive sensors (e.g., space, air, ground, manned, unmanned, unattended, human) to provide commanders and Soldiers with near real-time, relevant, tailored, actionable battlespace information. Enhancing BA capabilities provides commanders and Soldiers with more confidence in their understanding of the operational environment and associated operational opportunities and risks. This translates into better and faster decision-making in the anticipation, planning and execution of operations. BA is the key to increasing the reach, persistence and agility of our military capabilities while also increasing the range of military options available to achieve desired effects and endstates.

Observation and information collection occurs throughout the battlespace from traditional ISR sensors and collectors—including space, airborne and ground-based sensors and HUMINT—to sensors specifically designed to support weapons systems (e.g. Firefinder), to nontraditional sources, such as commercial and open sources. Each of these entities represents a node in the BA network. These nodes provide data and information to the network and draw information and actionable intelligence from it, as well as contribute to an extremely fine-grained depiction of the battlespace. Through the network, intelligence on activities in the operational environment and updated complex environment HIP information is collected, fused, analyzed and presented to create a comprehensive battlespace picture.

Baseline complex environment HIP data includes human terrain information on significant social aspects such as the culture, tribes, religions, economic, political and security situations. Information terrain

includes all aspects of how people create, use and share information in the operational environment such as traditional enemy electronic order of battle, television and radio stations, newspapers, internet and cyber factors. The physical terrain includes subterranean information, the weather, cloud cover, vertical temperature profile, humidity, wind, precipitation, soil moisture, ice cover, sea ice, vegetation, infrastructure, resources (e.g., water, energy sources, building materials), second-order effects such as trafficability and sensor field of view. By using the collection capability of all possible nodes, the reach, robustness and persistence of the entire sensing network are greatly enhanced to create a pervasive, detailed understanding of the battlespace.

Current and projected operational information will be continuously fused by robust knowledge management systems and disseminated to all levels of users through adaptable, flexible, networked communications systems. Within this "producer interactive network," force elements will subscribe to products or data (including archival data). Software agents will broker data and products, posting some unprocessed information. In this manner, all Joint, Allied, and Coalition warfighters will have a synchronized COP of the battlespace with access to common data, within security access and transport layer constraints, and the ability to construct their own tailorable, relevant operational pictures resulting in enhanced BA.

SPACE CAPABILITIES

Space is a significant area of Joint development that supports enhanced BA capabilities, and is the backbone for the national and military ISR architecture, as well as the domain of choice for commercial broad-area sensing enterprises with military utility. Space-based communications provide reach and NLOS connectivity, while space-based ISR and commercial imagery platforms substantially enhance strategic, operational and tactical intelligence collection, processing, and dissemination. Space-based assets continuously monitor the globe for foreign missile launches and can be leveraged to detect large infrared events on the ground in near-real time. Soldiers in OEF and OIF use space-based systems to communicate, navigate, target, find and fix the enemy, anticipate weather, receive missile warning, maintain situational awareness across extended areas of operations, avoid fratricide and much more.

Army Space Forces are deployed worldwide supporting U.S. efforts to fight and win GWOT. Army Space Support Teams have provided space products and services to corps, Marine Expeditionary Forces, and Joint Task Force headquarters throughout OIF/OEF. Space Support Elements, as part of modular division and corps staffs, have filled a critical space planning and coordination role. Army Space Forces continue to enhance the effective application of space-based assets and capabilities across the full range of military operations in an interdependent, Joint, and multinational environment.

ROLE OF SPACE IN THE ARMY

Among the Army's formidable capabilities is its global space reach, with assets and operations around the world. Space support to Army operations is divided into four space mission areas: Space Force Enhancement, Space Control, Space Force Application, and Space Support.

Army Space Forces execute tasks within the Space Force Enhancement and Space Control mission areas. Space Force Enhancement functions improve

the effectiveness of forces across the full spectrum of operations by providing space-based operational assistance to ground maneuver force elements. These functions include long-haul and reachback satellite communications spanning multiple frequency domains, environmental monitoring of both terrestrial and space conditions that may impact operations, and space-based intelligence, surveillance, and reconnaissance. Other Space Force enhancement functions provide precision position, velocity, navigation, and timing information that is crucial to modern combat operations, theater missile warning, and near-real time battlefield characterization.

Space Control operations ensure freedom of action in space for the United States and its allies and, when necessary, deny an adversary freedom of action in space. Space control involves the interrelated objectives of space surveillance, protection, prevention, and negation.

DISCUSSION OF KEY BATTLESPACE AWARENESS MATERIEL PROGRAMS

SPACE SUPPORT ENHANCEMENT TOOLSET (SSET)

SSET provides Army Space Support Teams (ARSST) and Space Support Elements (SSE) the specialized tools and software to maintain Situational Awareness of all space assets, monitor satellite status, and produce specialized products from space-based assets, as well as providing the capability to maintain continuous communications with National and Joint space organizations in CONUS. SSET is a mission-essential item of equipment for both ARSST, augmenting corps and JTF headquarters and other Services and Joint, Interagency and Multinational headquarters as military and strategic situations call for; and SSE, organic to modular division, corps and select Army headquarters. It provides capabilities needed by ARSSTs and SSEs to conduct space operations planning, integration and coordination and the production of enhanced space products.

The SSET currently is a COTS/GOTS prototype system that has been combat-tested in OEF and OIF, where space-based products provided by SSET-equipped teams provided enhance C2 and Situational Awareness for land force commanders. The complete SSET consists of a communications suite, four workstations and ancillary equipment housed in a V5 rigid-walled shelter, mounted on an M1113 HMMWV. Modular Force designs incorporate a four-person SSE at division level, a five-person SSE at corps level, and a six-person SSE at army level, each equipped with an appropriate version of SSET.

Program Status. SSET is an emerging requirement funded in the FY08-13 program. It has been developed through the efforts of the Space and Missile Defense Battle Lab. The Army Acquisition Executive assigned SSET system life-cycle management responsibilities to the Program Executive Office Intelligence, Electronic Warfare and Sensors.

GRENADIER BRAT (GB) AND MINI-TRANSMITTER (MTX) BLUE FORCE TRACKING (BFT) SYSTEMS AND SUPPORTING ARCHITECTURE

GB and The MTX are two separate and distinct current DoD BFT systems that leverage and take advantage of the existing national space infrastructure/National Technical Means (NTM). These devices give commanders the ability to track and receive position location information (PLI) of dismounted teams and vehicles equipped with the devices. The systems are monitored and disseminated by the Mission Management Center (MMC), which supports GB/MTX use of the existing COBRA architecture by coordinating with national system managers and warfighting units to help collect, process and disseminate operational BFT data. These BFT systems, the MMC, and the NTM architecture give operational-level commanders a COP which substantially increases their Situational Awareness.

Program Status. GB was acquired as a Warfighter Rapid Acquisition Program and currently 500 systems are fielded with U.S. Army Special Operations Command, U.S. Central Command,

and U.S. Army South. No further systems will be procured and the program will be de-fielded by first quarter, FY08 due to architecture updates. There are approximately 5,500 MTX systems produced and fielded to all services, USSOCOM components, and Other Government Agencies that have a specialized requirement for secure/LPI/LPD BFT support and will continue to be available as a lightweight man portable BFT device.

DISTRIBUTED COMMON GROUND SYSTEM-ARMY (DCGS-A)

DCGS-A is the Army's contribution to the DoD DCGS program. Its core functions are ISR integration, fusion of sensor information, and direction and distribution of sensor information. DCGS-A will draw information from a wide variety of automated and manual sources, space platforms, unattended air and ground vehicles, existing and new ISR capabilities, and an assortment of databases. The system enhances the capabilities of current and Future Force commanders to execute battle command, synchronize fires and effects, rapidly shift battle focus, achieve situational awareness, and protect the force. It does so by providing tactical and operational commanders access to advanced ISR capabilities and allows them to synchronize ISR collection, exploitation, processing, and distribution of information, while operating in a multi-level security network. DCGS-A is a complementary system to FCS and will affect all levels of the Army by providing fixed systems at theater MI brigades, mobile systems at battalion to Army Service Component command levels, and embedded software to provide ISR data and access to ISR systems to soldiers operating non-ISR, non-intelligence systems.

Program Status. Army has combined the DCGS-A program and the Joint Intelligence Operations Capability-Iraq (JIOC-I) QR Capability to accelerate the provision of an initial DCGS-A capability to the force. DCGS-A (V3) software combines the capabilities of existing DCGS-A JIOC-I (now known as DCGS-A (V2)), and All Source Analysis System-Light (ASAS-L) software. It has been tested successfully at the Central Technical Support Facility (CTSF) and will undergo an Operational Assessment in third quarterFY07. Afterwards, the Army intends to upload this software in existing transit-cased DCGS-A (V2) hardware and ASAS-L hardware in Iraq and Afghanistan. DCGS-A (V4) will incorporate the capabilities of all the Army's ISR systems migrating into DCGS-A and provide vehicle-mounted equipment for tactical units. The DCGS-A (V4) Critical Design Review is scheduled for 2QFY07 and a Limited Users Test will be conducted in second quarter, FY08 with a Low Rate Initial Production/MS C decision scheduled in third quarter, FY08. Through a combination of upgrading current Program of Record equipment and the fielding of production DCGS-A (V4) systems, the Army intends to field an initial DCGS-A capability to the Force by the end of FY10, which was the program's initial IOC date. DCGS-A (V3) and (V4) make up DCGS-A Increment 1. DCGS-A Increment 2 continues the research and development required to meet the full DCGS-A operational requirements as future sensors and capabilities are introduced. An Increment 2 MS B decision point is scheduled second quarter, FY09.

ALL SOURCE ANALYSIS SYSTEM (ASAS)

ASAS is the Army's primary intelligence fusion program, found at all Army echelons from battalion to field army. It automates the planning and management of intelligence, counterintelligence, and electronic warfare operations; intelligence collection management; the processing and analysis of intelligence and combat information; and the dissemination of intelligence and combat information products to tactical and operational commanders.

ASAS provides an automated interface to the Army Battle Command System (ABCS) and the Joint Global Command and Control System. These interfaces provide battlefield commanders with enhanced situational awareness and timely intelligence on enemy force deployments, capabilities and potential courses of action, as part of the COP. In turn, the Army intelligence community receives current information on blue force locations, activities and plans.

As the Army begins to fuse intelligence and operations, ASAS provides the initial automated intelligence capabilities required for this enhanced command, control and intelligence support. ASAS systems begin upgrading to DCGS-A capable configurations in FY07. By FY08, all new ASAS systems will be DCGS-A capable and a program to upgrade previously fielded systems will be in operation.

Program Status. ASAS Block II is in FRP. Beginning FY07, all ASAS systems produced will meet DCGS-A specifications and be fielded as integral components of the Army's initial DCGS-A capability. The program to upgrade currently fielded ASAS equipment to this configuration will begin no later than FY08. By end of FY09, ASAS will be totally merged into the DCGS-A program and will cease to exist as a separate entity.

AERIAL COMMON SENSOR (ACS)

ACS is the Army's future airborne system that meets airborne ISR requirements for a worldwide, self-deployable asset that can begin operations immediately upon arrival into theater, in front of, or alongside the Joint force. ACS will support the theater down to the BCT commander and will merge and improve to ACS as a division and below centric system, able to support echelons theater to BCT and below. ACS will revolutionize the capabilities of Guardrail Common Sensor and Airborne Reconnaissance-Low into a single multifunction platform to provide the requisite networked Situational awareness and joint network-centric and deep-strike precision targeting for the future Joint force commander. ACS provides multi-intelligence precision targeting and distributed, wide-area, persistent surveillance throughout the breadth of the JOA battlespace. Using a DCGS compatible ground station component, ACS, via robust sensor-to-shooter and reach links, will provide commanders at every echelon with the tailored, multisensor intelligence required for dominant maneuver, precision engagement, information superiority and decision dominance throughout a nonlinear framework and noncontiguous battlespace. Onboard battle command and communications relay packages with the ISR payload will ensure uninterrupted, Joint integrated C4ISR support to the maneuver commander across the spectrum of conflict and through all phases of the battle. ACS's modular, open architecture, with onboard SIGINT, imagery intelligence (IMINT) and measurement and signature intelligence (MASINT) subsystems, fuses the EO, IR, synthetic aperture radar (SAR), moving target indicator (MTI), multi- and hyper spectral imagery sensors to provide a single multi-INT view of the threat. ACS combines on-board and off-board analysts/operators with onboard battle command and communications relay and intelligence functions for a robust multi-purpose system that enables the commander to see first, understand first, and finish decisively.

Program Status. Due to capability limitations of the selected airborne platform, the Army terminated the ACS contract for convenience on 12 January 2006. The Army did not terminate the ACS program, only the contract. ACS capabilities remain valid Army requirements. The ACS system will provide the Army with significant improvements over the current fleet of ISR aircraft. OSD directed a 6-month Joint ISR (JISR) study in January 2006 aimed at determining future DoD airborne ISR requirements. The study validated the need for future manned, airborne ISR. The Army is using the results from the JISR study to further define its ACS requirements and acquisition strategy and work toward re-competing and restarting the ACS development contract in FY09.

ADVANCED FIELD ARTILLERY TACTICAL DATA SYSTEM (AFATDS)

AFATDS is the primary Army fire support system that provides tactical and technical fire solutions, including weapon-target pairing, mission planning and execution. AFATDS provides the fires COP at each echelon, as well as the technical fire control providing ballistic solutions for cannons and rockets. AFATDS is a true Joint system: fully fielded by the USMC, on Navy ships, and interoperating with the USAF via the Air Force's TBMCS. As such, AFATDS provides a full range of situational

awareness, battle management, planning, and target analysis and engagement capabilities for the employment of all supporting arms and assets.

AFATDS operates from platoon to EAC, providing a tactical and operational picture of the battlefield. AFATDS provides the friendly picture of the location and status of all friendly fire support assets; the enemy situation, including tracking all enemy target locations; and a running fire support logistics status (e.g., propellants, projectiles, fuzes). AFATDS provides graphic control measures, maintaining a complete database of fire support geometries and fire support coordinating measures (FSCMs), and performing appropriate levels of coordination as required. The AFATDS target database and weapon status-tracking feed the commander's SITREP. AFATDS management of the FSCM and capability overlays ensure optimal weapon target pairing and strategic attack analysis.

Program Status. AFATDS is currently fielded to 11 Navy ships, 100 percent of USMC and active Army units, and 98 percent of Army National Guard units, with the remainder scheduled for FY07 fielding. Version 6.4 software is currently in use. Recently identified by OSD as completely interoperable with net-centric requirements (as they are currently identified), future developmental improvements will focus on increased joint interoperability, and new weapons and munitions functionality. This item is replacing the antiquated Gun Display Unit (GDU); OD-144/GYK-29 (V) 1 and 2. FUE is the 82nd Airborne Division.

LONG-RANGE ADVANCED SCOUT SURVEILLANCE SYSTEM (LRAS3)

LRAS3 provides unmatched long-range target acquisition and far target location capabilities to armor and infantry scouts. It consists of horizontal technology integration second-generation FLIR (cooled IR), long-range optics, laser range finder, GPS interferometer, day video camera, and a link to FBCB2 for automated handoff of target locations. As the premier ground scout sensor system, it enables scout and cavalry units to conduct RSTA missions while remaining outside threat acquisition and engagement ranges during all-weather and dirty battlefield conditions (i.e., fog, dust, smoke and sand). LRAS3 also is being integrated with a laser designator module as the Fire Support Sensor System for the Stryker Fire Support Vehicles and the Knight Fire Support Vehicles.

Program Status. LRAS3 is in FRP, and LRAS3 procurement is funded for both Active and Army National Guard Heavy and Infantry BCTs. LRAS3 is being fielded to HMMWV-mounted Scouts, the Stryker RVs and FSVs, and the Knight Fire Support Vehicle.

M1200 ARMORED KNIGHT FIRE SUPPORT VEHICLE

The M1200 Armored Knight provides precision strike capability by locating and designating targets for both ground and air-delivered laser-guided ordnance and conventional munitions. It replaces the M707 Knight (HMMWV base) and M981 Fire Support Team Vehicles used by Combat Observation Lasing Teams (COLT) in both Heavy and Infantry BCTs. Prior to 2005, Knight was delivered on unarmored HMMWV M1025 chassis configured with the Fire Support Sensor System (FS3). Up-armored HMMWV's with Knight MEP are approximately one ton over gross vehicle weight, and unable to accommodate user requirements for additional survivability, mobility, space and power. FY07 procures Armored Knight vehicles configured with the Armored Security Vehicle M1117 chassis. This will enable Armored Knight to meet Army's modularity requirements with FS3 objective sensor, improved survivability, mobility, mission payload, gross vehicle weight, and growth potential not attainable with HMMWV.

Armored Knight operates as an integral part of the brigade reconnaissance element, providing COLT and fire support mission planning and execution. Specifically, Armored Knight provides fire support planning, direction, control, target designation

and night observation in a highly maneuverable platform, and acquires, processes, and transmits target information directly into the AFATDS fire support network. It has the ability to self-locate, determine range, azimuth and vertical angle to target, target destination and night observation. This capability provides terminal guidance for any munitions requiring reflected laser energy.

Armored Knight's secondary mission is gathering intelligence through AOR surveillance and reconnaissance. Armored Knight utilizes an M1117 ASV hull and provides full 360-degree, continuous armored cupola coverage and the fully integrated Knight Mission Equipment Package (MEP) common with the M7 BFIST/M707 Knight and Stryker FSV.

Program Status. Current FY07 funding supports procurement of 107 M1200 Armored Knights, to be delivered beginning March 2008. Program fully funded thru POM 08-13 to meet modularity end-state of 342 systems.

TACTICAL EXPLOITATION SYSTEM (TES)

TES family of systems is the Army's Tactical Exploitation of National Capabilities (TENCAP) system that tasks directly, receives through direct downlinks or relays, processes, exploits and disseminates electronic intelligence (ELINT), communications intelligence (COMINT) externals, Imagery and MTI data from satellites, USAF (U-2, Global Hawk, Predator & JSTARS), and Navy (P-3, Maritime Global Hawk & SHARP) aircraft/sensors, and from direct downlinks and other fixed and mobile ground stations. TES is embedded in the corps and division force structures is providing vital space-based and airborne imagery, signals intelligence (SIGINT), blue force tracking and communications reach to and from deployed units for OIF. The TES family of systems is a key part of the emerging DCGS architecture with TES variants in Army, USN, USMC, limited USAF units, and selected national and joint agencies/headquarters. TES software and middleware are the basis for DCGS-A fixed systems.

The TES program combines the intelligence functions of four previously stovepiped ISR collection systems into an integrated downsized, open, scalable, modular and network-centric architecture with all elements fully transportable by C-130 aircraft. TES generates timely information, intelligence and precision targeting data. TES also is capable of limited MASINT processing and analysis. TES receives space-based blue force tracking data and provides it to the GCCS Army. TES has a direct digital/network interface with the AFATDS, Automated Deep Operations Coordination System and the Joint Intelligence Operations capability Iraq/Afghanistan (JIOC-I&A). TES performs preprocessor, processor and analytical functions for the ASAS, Common Ground Station, JIOC-I/A, and Digital Topographic Support System.

Program Status. TES-Main and TES-Forward systems have been fielded to III, V, and XVIII Airborne corps, and 513th MI Brigade. As the Army transforms to its new structure, the TES-Main will support the theater as a component of the Theater Intelligence Brigade (TIB) and the TES-Forward will be organic in both the Corps and selected TIBs. The first TES Main moved to a TIB from XVIII Airborne Corps in FY06 as the Corps started its transformation to a Modular Configuration. Division-TES (DTES)have been fielded to all Active divisions. The TES-Forward (minus) was fielded to the 501st MI Brigade and to I Corps in FY06. Thirteen of 21 TES-Lite systems were fielded to I Corps, SOF units, Korea, and selected TIBs in FY06. An additional eight will be fielded to XVIII Airborne and III Corps, SOF units, and selected ARNG units on a rotating bases to support OIF/OEF deployments in FY07.

The JIOC I has been fielded to Multinational Forces-Iraq command center. The TES Remote Interface System that provides expanded direct database access between TES/DTES and ASAS has been fielded to XVIII Airborne Corps, along with III Corps, V Corps, 4th ID and as stay-behind equipment in support of Multinational Corps-Iraq (MNC I). A number of TES systems continue to be deployed in OEF and OIF and judged in after-action reviews as being very supportive of high OPTEMPO, ISR and dynamic targeting demands.

TES systems were/are the primary source of theater and national near real-time imagery and SIGINT data for MNC-I and divisions. TES software and middleware are key subsystems for the DCGS-A fixed that have been fielded to 513th (3rd Army) 66th (U.S. Army Europe), 500th (U.S. Army-Pacific) and 501st (8th Army) MI brigades. TES systems will be in the force structure until the objective DCGS-A system is fully fielded, sometime after 2012. Significant TES components will be re-designated as DCGS-A components over the next three to four years.

INTEGRATED METEOROLOGICAL SYSTEM (IMETS)

IMETS supports the current force, including aviation, SOF and SBCTs, and the transformation to the modular design. IMETS consists of CHS products, GOTS software and USAF-provided COTS equipment and is integrated into two distinct configurations: the vehicle-mounted version that supports tactical operations from EAC down to separate brigades, and the light required to support highly mobile, forward elements and Special Forces units based upon a laptop platform design. It will migrate through spiral development to DCGS-A in the future modular force in 2008.

IMETS ingests local aviation surface weather and artillery upper observations, weather satellite data, and observations from unattended, automated observing equipment. IMETS receives transmissions of centrally prepared USAF forecast products. IMETS uses Army weather effects software linked to current and forecast data to determine weather effects on friendly and enemy personnel, equipment and operations. IMETS provides tailored weather forecasts and space weather impacts for planners and operations, including chemical defense. Weather effects are linked to users within each supported TOC by direct machine-to-machine interface, enabling users to interact with the database to determine details on adverse weather effects. IMETS is the gateway and communications interface to support major subordinate commands and warfighters without direct weather support.

Program Status. The vehicle-mounted and light configurations are in FRP and are being fielded to AC and RC units supporting OIF-OEF. In FY07, the USAF Joint Environmental Toolkit software package is be integrated in the IMETS software baseline and is scheduled to be fielded with ABCS software Block SWB 10-12. This is the software baseline will provide the bridge until DCGS-A and FCS integrate the capabilities.

TROJAN SPECIAL PURPOSE INTEGRATED REMOTE INTELLIGENCE TERMINAL (SPIRIT)

Trojan SPIRIT provides assured Top Secret/Special Compartmented Information (TS/SCI) satellite communications to deployed warfighters from brigade to EAC. It provides critical intelligence reach to strategic, operational, and tactical Army and Joint formations. Trojan SPIRIT was born as a quick-reaction capability during Operations Desert Shield/Storm, as commanders needed a way to receive time-sensitive TS and Secret imagery and intelligence data at high data rates. From those beginnings, the system became a program of record in 1993, designated the Trojan SPIRIT II, with initial fieldings to separate brigade/ACR, division, corps, and EAC units. Trojan SPIRIT II fielding ended in 1998, but the advent of the Stryker brigade brought the system back to life with a new variant, the Trojan SPIRIT Lightweight Integrated Telecommunications Equipment (Trojan SPIRIT LITE). There are three versions of the Trojan SPIRIT LITE: a transit case version (V1), in use by SOF, and two wheeled versions (V2/V3) used at the BCT through EAC levels. All feature a 2.4m satellite dish that provides up to T-1 (1.544 mbps) throughput using the C or Ku frequency bands. Each Stryker brigade receives two V2 and one V3 Trojan SPIRIT LITE. Under the Modular Force design, each BCT receives one V3 system, a significant increase in Trojan SPIRIT density across the force. The new divisional headquarters retains the two Trojan SPIRIT II systems formerly in the division MI battalion, with fielding of a third system (a LITE V3) in FY08-10 to provide TS/SCI bandwidth for Tactical Command Post 1.

Program Status. Trojan SPIRIT is an interim solution for assured TS/SCI satellite communications until the fielding of WIN-T. The program is beyond MS III. LITE V2 production will cease in FY07 after fielding of Stryker Brigade 7. LITE V3 production and fielding will continue through FY11 as the Army resources all modular force brigades and ARNG Division headquarters with the system.

PROPHET

Prophet provides a near-real-time view of the BCT/ACR/SBCT AOR through use of SIGINT sensors, and includes the capability to detect, identify, and electronically attack select enemy emitters. It is a dedicated, dynamically re-taskable asset, allowing the tactical commander to visually depict and understand his battlespace, now and in the future. It provides expanded frequency and area coverage for situational development and awareness, as well as force protection operations. Prophet can operate on-the-move, mounted on a HMMWV, or stationary in a mounted or dismounted configuration. It has an open architecture that supports programmed improvements and mission-specific technical insertion components. This makes Prophet relevant throughout the entire spectrum of operations and able to exploit critical high-value emitters.

Program Status. Prophet Block II is in LRIP, and the first systems will be available for fielding in late FY08. In response to the global war on terrorism, the Army will also begin fielding an interim Block III capability in late FY07. The production version of Block III continues in SDD and is expected to undergo IOT&E in FY09 with FUE in FY10.

TACTICAL UNMANNED AERIAL VEHICLE (TUAV) SHADOW 200

The RQ-7A Shadow 200 TUAV provides the maneuver commander with a near real-time, highly accurate, sustainable capability for over-the-horizon RSTA and BDA. Each Shadow 200 TUAV system consists of four Shadow 200 air vehicles, six HMMWVs, two GCS, one portable GCS and four remote video terminals that can provide near real-time video to commanders on the ground.

The Shadow 200 TUAV has an onboard electro-optical (EO)/IR sensor payload. Future planned improvements include a laser designator, a tactical common data link for secure, jam-resistant data forwarding, and an upgrade of the engine to gain reliability improvements. The threshold range is 50km with an objective range of 200km and an on-station endurance of four hours. The threshold payload is 60 lbs with an objective capacity of 100 lbs. OPTEMPO requires a threshold of 12 hours per 24-hour period and an objective of 18 hours per 24-hour period.

Program Status. FUE was 3/2 ISBCT in May 2002 and IOC was achieved in October 2002. The TUAV program was revalidated by JROC in 2004. Production and fielding continues under the FY07-11 program plan.

COUNTERINTELLIGENCE/HUMAN INTELLIGENCE INFORMATION MANAGEMENT SYSTEM (CHIMS)

CHIMS provides counterintelligence (CI) investigators, HUMINT team Soldiers, and interrogators automation support for the collection, reporting, and dissemination of HUMINT and CI information, imagery, and biometrics. CHIMS provides automation systems and software tools for the collection, reporting, production, and mission management of actionable intelligence reports and associated data to intelligence collectors and MI units. It is designed to support the commander's ability to anticipate and react to a wide range of human intelligence and force protection threats and situations. During November 2006 life-cycle acquisition responsibility for the collection and reporting components of the CHIMS transitioned from PM DCGS-A to TENCAP. CHIMS CII OPS Workstation (AN/PYQ-7) was retained by PM DCGS-A to provide human domain analysis capability within the DCGS-A architecture.

The Individual Tactical and Reporting Tool (AN/PYQ-8) and Counterintelligence/Human Intelligence Automated Tool Set (CHATS) (AN/PYQ-3) make up the CHIMS collection and reporting capability. CHIMS is a member of appropriate

DCGS-A IPTs to ensure interoperability with DCGS-A and Joint and National capabilities. Additionally, biometrics systems and architectures are currently being matured and designed into CHIMS in order to provide IAFIS compliant fingerprint, facial recognition, and iris scan collection and query capabilities. Document Exploitation has been upgraded within CHARCS systems to the latest Army Research Labs toolset with screening of over 70 languages available to the user.

Program Status. The current CHIMS has completed its Spiral development program with the successful release of version 4.3 and post-development software support (PDSS) transitioning to U.S. Army Communications Electronics Command (USCECOM) FY08. CHIMS is the next evolution for CI and HUMINT collection and reporting addressing the lessons learned from the 2,000-plus systems fielded through FY06 to Army units in support of GWOT. New software being designed under CHIMS Increment 2 development FY07-10 will aggressively leverage the open architecture framework defined by DCGS-A and provide flexible, modularized human intelligence collection and reporting solutions.

SEQUOYAH FOREIGN LANGUAGE TRANSLATION SYSTEM (S-FLTS)

Military, contract, and host nation linguists provide a critical capability that is unavailable in sufficient numbers to satisfy the language translation needs of the Services, Joint, and National agencies. The S-FLTS addresses this capability gap by enabling non-linguists with two-way automated speech and text cross-lingual communication capabilities on demand. S-FLTS will provide commanders an organic capability to rapidly perform two-way speech and text cross-lingual operations at all echelons and in all environments where linguist support is minimal or unavailable. S-FLTS interoperable design will enable it to be embedded on diverse platforms throughout the joint community which includes, but is not limited to, the BCS, GSS, FCS and the DCGS. S-FLTS capabilities will be available via a browser, and as downloadable modules for systems that are not always linked to the network (mobile and handheld systems).

Program Status. The Army has been designated as the lead Service for S-FLTS with JROC interest designation. Joint Forces Command, in response to an Urgent Need Statements provided by the Multi-National Security Transition Command-Iraq, 25th Infantry Division, USCENTCOM., USPACOM and USSOCOM is providing the initial speech to speech capability by leveraging DARPA's tactical translation program. DARPA's Global Automomous Language Exploitation program is being leveraged to provide the Text to Text capabilities. The First Spiral IS2S prototypes are currently being assessed by the Army Test and Evaluation Command for their operational performance. It is anticipated that the Third Spiral (March 07) will produce systems that provide military utility and will transition to S-FLTS to establish the foundation system to build upon.

Appendix 5: Command and Control (C2)

Command and Control is the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. C2 consists of the arrangement of personnel, information management, procedures, equipment and facilities essential for the commander to conduct operations. To accomplish this effectively, the commander fuses battlespace information with information on force locations and capabilities, as well as other information relevant to mission planning, into a shared situational awareness (Blue, Red, and Grey to include combat identification) that is displayed on a tailorable COP. The commander develops alternative plans of action, selects a course of action and directs force employment exercising C2.

Military and rapid decision-making processes, as part of the overall C2, allow for preparation of a campaign or battle and for response to battlefield opportunities or challenges. Key elements of C2 are a decentralized, networked and collaborative communications and computer environment that provides the precision guidance and timing

capabilities that collectively support accelerated decision-making processes throughout the Joint force. The synergy of this collaborative environment with the COP allows subordinate commanders to self-synchronize their activities, based on knowledge of the commander's intent and of the current situation in battlespace, and to execute actions seamlessly, with minimal or no requirements for deconfliction or coordination.

Army C2 is a critical enabler for and a fully interoperable component of NETWORK-ENABLED COMMAND CAPABILITY (NECC). Army C2 is an enabler for battle command, which is the execution of command against a hostile, thinking enemy. NECC Joint concepts and Army battle command concepts are complementary and commander-centric. The C2 Joint Integrating Concept (JIC) capabilities are exercise command leadership; establish and adapt command structures and enable both global and regional collaboration; develop and maintain shared situational awareness and understanding; communicate commander's intent and guidance; plan collaboratively; synchronize execution across all domains; monitor execution, assess effects and adapt operations; and leverage mission partners. Both are focused on achieving better situational understanding and decision dominance.

Army C2 will interoperate seamlessly in the Joint force. Commanders must be able to exercise effective C2 of an interdependent Joint force in rapidly changing scenarios involving complex distributed, simultaneous or sequential operations often with other agencies and nations. Commanders must effectively integrate disparate capabilities from a variety of sources into a cohesive force. Commanders must rapidly achieve coherent, decisive effects against a variety of adversaries, exploiting information superiority and taking the offensive whenever practical. Commanders must be prepared to make decisions in a volatile, uncertain, complex, ambiguous environment against irregular, catastrophic, disruptive and conventional threats. Commanders must be able to conduct robust collaborative planning under severe time constraints. Commanders will need to exercise

the core functions of C2 anytime and anywhere in degraded network environments and from austere as well as robust fixed sites, from mobile sites and in transition between sites. Commanders must communicate, collaborate and monitor joint and combined operations in a highly decentralized environment. Commanders must maintain unity of command within a Joint and/or combined force and unity of effort with mission partners.

To properly support and sustain the commander's intent on the battlefield, the COP must also provide information from the common operating logistics environment (CLOE) that enables timely and accurate logistics readiness information and sustainment requirements to both operational warfighters and logistics managers. CLOE fuses information, logistics processes, and platform/soldier embedded sensor –based technologies to support the tactical, operational, and strategic sustainment levels of war that operate in a Joint integrated logistics.

During 2006, the Army's CLOE initiative resulted in the development of the Army Integrated Logistics Architecture (AILA) to support the DCS, G-4's Warfighter and Business Mission Areas. This

architecture supports Army modularity, execution of the JCIDS process, portfolio management, capability and gap analyses, standards identification, and DOTMLPF analysis in support of JCIDS Capability Based Analysis. The AILA capabilities will be demonstrated in FY07 for initial implementation in an aviation brigade and ground brigade combat team.

The Army conducted a demonstration of the use of sensors to monitor the condition of medical and individual protective equipment assets, in storage and in transit. The tests included shipments from CONUS and OCONUS locations to deployed units in Iraq and Afghanistan. The Army is currently evaluating the results and the potential utility of these technologies to other classes of supply, to include, food, ammunition, and other life-limited assets. The Army is also exploring the entire spectrum of existing and emerging wireless communications technologies, exploiting the advantages of those technologies that will effectively close the gaps in the supply and distribution system achieving near-real-time in transit visibility and enabling total asset visibility.

Army C2 will be in consonance with the transformation of Army logistics capabilities. These logistics capabilities must support operations that are continuous and distributed, across the full range of military operations. The future logistics system will be characterized by a net-centric, distribution-based, anticipatory, demand-driven, performance-based approach to the Joint logistics enterprise. Although still in a conceptual exploratory phase, adaptive logistics is a capability to provide key aspects of the sense and respond logistics (S&RL) vision in a manner to create situational understanding and actionable information where none previously existed.

The S&RL concept predicts, anticipates and coordinates actions that provide warfighting advantages spanning the full range of military operations across the strategic, operational and tactical levels of war. S&RL lets logistics support more closely conform to unfolding battlefield conditions, while remaining intimately connected to a commander's intent, thereby enabling more fluid operations and creating an ability to seize local opportunities as they develop. It requires a network-centric enterprise and disciplined collaboration within and across communities of interest.

Synchronizing the logistician's decision cycle to that of the warfighter enables a logistics system that is focused on the effect a given action in the logistics domain will have on the warfighter planned or executing intent. The end state is for logisticians to operate within the construct of a global, end-to-end Joint distribution enterprise that synchronizes and integrates all elements of the logistics system to ensure consistent, reliable and predictable support to the Joint force commander's concept of operations, in which speed and flexibility are the most demanding battlefield requirements.

BATTLE COMMAND

The Army views battle command, the art and science of applying military leadership and decision making, as the essential capability that enables the conduct of current and future Joint operations. Enabled by C4ISR, battle command enhances the commander's ability to gain information and decision-making advantages over any adversary. Further, C4ISR networks within the Global Information Grid will provide an inherently Joint, top-down network that provides common situational awareness to improve battle command. Army battle command modernization efforts are designed to bridge the current to Future Forces, enable network-enabled battle command, and allow

the operational and tactical commander to see first, understand first, act first, and finish decisively with unprecedented situational understanding and decision superiority.

DISCUSSION OF KEY COMMAND AND CONTROL MATERIEL PROGRAMS

ARMY BATTLE COMMAND SYSTEM (ABCS)

Description: ABCS is the Army's component of the Global Command and Control System (GCCS) and combatant commander's deployment C2. It is a complex system of systems that receives and transmits information among the Joint force. ABCS consists of subsystem software that provides specific support for the battlefield functional areas, including Global Command and Control System-Army (GCCS A), Maneuver Control System (MCS), Air and Missile Defense Workstation (AMDWS), Force XXI Battle Command Brigade and Below (FBCB2), All Source Analysis System-Light (ASAS-L), Advanced Field Artillery Tactical Data System (AFATDS), Integrated Meteorological System (IMETS), Digital Topographic Support System (DTSS), Battle Command Sustainment Support System (BCS3), Integrated Systems Control (ISYSCON) and Tactical Airspace Integrated System (TAIS). Additionally, common software products enable information sharing with other systems and provide situational awareness of the battlefield to every echelon.

Program Status. The Army has reassessed the ABCS software and conducted an operational test and evaluation (OT&E) for ABCS 6.4 in 3 QTR FY06. The new baseline software will be used on all ABCS systems. ABCS 6.4 will maintain a Joint interoperability with other Services at the division level and above, while still providing the COP at division and brigade levels within Services. The test will also assess the current distribution and sustainment strategy to see what initiatives can take place in order to further promote ABCS interoperability across the Army and within the Joint force structure.

GLOBAL COMMAND AND CONTROL SYSTEM-ARMY (GCCS-A)

GCCS-A is a computer-based, strategic, operational and tactical C2 system that provides readiness reporting, mobilization and deployment of Active and Reserve forces and links Army C2 systems to theJoint fight. It also provides detailed information on intra-theater planning and movement, and the Joint interface between NECC systems and the Army ABCS components. GCCS-A provides Joint COP information to Army users and provides Army forces information to the Joint COP. GCCS-A is a seamless Army extension to the joint GCCS at echelons above corps through modular division levels. GCCS uses a common open-systems hardware architecture that has a combination of government and COTS hardware and software. The GCCS-A is an integral component of the GCCS family of systems (FoS), a networked system of information systems to facilitate Joint command and control.

Program Status. GCCS-A is a fielded system within the ABCS. GCCS-A upgrades are based on operational needs and technical interoperability requirements with Joint GCCS, DII COE and ABCS. GCCS-A, along with the other GCCS FoS, is mandated to migrate to a net-centric C2 capability; the current program in development to accomplish this direction is the DoD NECC capabilities initiative (see below) is projected to begin fielding the new net-centric capabilities, integrated with the GIG Net-Centric Enterprise Services (NCES), during Block 1 execution in FY08-09.

NETWORK-ENABLED COMMAND CAPABILITY (NECC)

The objective "mission space" for this capability is defined as the area supporting C2 activities from the National Military Command System through the Joint Task Force and Service/Functional components to unit level commanders. As such, the NECC enables horizontal and vertical information flow and collaboration across this command spectrum. In addition, the NECC exploits global expertise and information centers of excellence

(CoE) through reach-back functionality, based on net-centric services. The NECC mission space for Increment I focuses on the Joint force commander while also extending one level up (COCOM) and one level down (Functional and Service Components) with emphasis on situational awareness and Joint operations planning.

The NECC integrates existing and emerging C2 capabilities through an enterprise-based joint architecture integrating applications and databases. The enterprise for NECC includes Joint warfighters, coalition partners, and agencies responsible for homeland security and defense. (Note: "Enterprise" in the case of NECC includes the Joint warfighting and business domains.) This flexible Joint architecture supports changing warfighter and business processes while not constraining the process owners. The existence of the Global Information Grid, ongoing bandwidth expansion efforts and a variety of other capabilities provided in this section are necessary enablers of the NECC.

Program Status. The ASD(NII) renamed the Joint Command and Control (JC2) Capabilities program the Net-Enabled Command Capability (NECC) via a Milestone A, Acquisition Decision Memorandum (ADM) dated on 7 Mar 06. All Components and DISA have stood up program offices under a Joint PEO, DISA's PEO C2C, and are conducting Technology Development Phase activities. A mid-phase Integrated Program Review was held on 16 Sep 06. A Milestone B decision will be sought 4QFY07, but the program is looking to accelerate the decision to 3QFY07. Beginning in the FY08-10 timeframe, the NECC will become the Department of Defense principal command and control information technology, as envisioned in Joint Vision 2020.

MOUNTED BATTLE COMMAND ON THE MOVE (MBCOTM)

MBCOTM is an evolutionary capability that provides Combined Arms Commanders all of their information resident in their Tactical Operations Centers (TOCs) and the required communication necessary to command and control their Combined Arms team on the move (OTM) or at a quick halt from any vantage point on the Joint battlefield. This capability is provided through a suite of Army Battle Command Systems and C4ISR systems integrated into a combat vehicle platform to provide brigade, division, and corps commanders all of the digital capabilities provided in their TOCs while on the move. Specific stakeholders include the vehicle platforms such as Bradley CV, Stryker CV, and up Armored HMMWV, supporting Operation Iraqi Freedom (OIF). MBCOTM provides the ability of increased situational awareness and understanding while enabling those commanders to operate forward during execution of their respective combat plans, empowering them to be tactically located forward without degradation of the COP. MBCOTM integrates available Joint and Army maneuver and Intelligence information, collaboration tools, current office automation applications with Line-of-Sight (LOS) and Beyond-Line-of-Sight (BLOS) tactical voice radios, broadband data communications systems and reliable computing devices into the commander's vehicles. The Mounted Battle Command on the Move program utilizes Government-Off-The-Shelf and Commercial-Off-The-Shelf equipment and technology to provide a solution that will standardize and optimize the OTM Battle Command solutions for commanders at brigade and division levels. The MBCOTM system will provide commanders with a state-of-the-art communications capability that will enable the exchange of information (voice, data, and video) throughout the tactical theater. This system is required because current tactical communications systems cannot support commanders operating on a highly mobile, non-contiguous battlefield with mobile command and control capabilities.

Program Status. Program is currently funded for RDTE in the FY07 budget. A Milestone C/LRIP is scheduled for 3QFY07 for the MBCOTM/CAMC2 Stryker and Bradley variants. Fieldings are scheduled to begin 4QFY08.

MANEUVER CONTROL SYSTEM (MCS)

MCS is an automated C2 system that provides a network of computer terminals to process combat information for battle staffs. This is the proponent

system for the common picture (integrates information horizontally and vertically to provide friendly and enemy unit locations). It provides automated assistance in the collection, storage, review, and display of information to support the commander's decision process. Both text and map graphics are provided to the user.

Program Status. MCS has successfully completed the IOT&E and has obtained FRP decision. MCS capabilities are being transitioned as services and will become part of the Joint Convergence effort. Command Post of the Future capabilities will also be added to MCS as a technical insertion.

COMMAND POST OF THE FUTURE (CPOF)

CPOF is an executive-level decision support system that provides situational awareness and collaborative tools to support decision making. It was designed to support parallel, synchronous, asynchronous, and cross-functional planning and execution. Team members share work spaces that embody their thinking about the current situation, and collaborate to create a rich, multi-perspective, shared operational picture. CPOF enables and expands the commander-to-commander interaction in order to magnify deep collaboration—collaboration that operates at the thought process level. CPOF enables commanders to access, view, configure and tune data, visualize workspace, and processes in ways that support their thinking. It provides the means for sharing and accessing understanding and the co-creation of actions.

Program Status. CPOF has transitioned from the Defense Advanced Research Projects Agency in April 2006 and is a technical insertion into MCS.

STANDARDIZED INTEGRATED COMMAND POST SYSTEM (SICPS)

SICPS is a family of systems that includes the SICPS Command Post Platform, Trailer Mounted Support Systems (including tents, environmental control, power management and lighting), Command Center System, Command Post Communications System, and Command Post Local Area Network. SICPS is primarily a non-developmental effort that integrates approved and fielded C2 and other C4ISR systems technology into platforms supporting the operational needs of the current mechanized, light, and SBCT forces, with applicability to the Future Force.

The objective of SICPS is to provide standardized Command Post infrastructure allowing commanders and staffs to digitally plan, prepare, and execute Network Centric operations through visualization of the COP and shared situational awareness. SICPS serves as an enabler for approved battle command systems providing a means to host the Army Battle Command System Information Services server associated with the ABCS 6.4 architecture, as well as other servers such as Maneuver Control System Sequential Query Language (SQL) servers, (CPOF) servers and servers associated with GCCS-A and in the future JC2-Army. SICPS will enable Future Force battle command systems as they are developed and will provide the integrated platforms necessary to enable digital battle command in support of Full Spectrum Operations.

Program Status. LRIP phase was initiated at the approved Milestone C decision in Jul 05. IOT&E and the Logistics & Maintainability Demonstration, using LRIP systems, were completed in Jun 06 and Jul 06 respectively. The First Unit Equipped was 1st Cavalry Division and Full Operational Capability was achieved in Sep 06.

ARMY AIRBORNE COMMAND AND CONTROL SYSTEM (A2C2S)

A2C2S is the Army's above-the-ground battle command platform that provides the commander with a highly mobile, self-contained and reliable integrated digital command post that is integral to transforming the Army from the current to future modular force. This system is fielded to aviation brigades supporting divisions deployed in OIF/OEF. The A2C2S, integrated on a UH-60L platform, enables the commander and his staff to traverse the battlespace while maintaining situational understanding through C4I connectivity at the decisive point on the battlefield at critical

times. It provides a LOS/BLOS voice and digital communications package.

Program Status. By the direction of the Assistant Secretary of the Army, the A2C2S program has been terminated at the end of FY07. The first A2C2S System delivered to the 82nd Airborne Div in September 06 and Unit training is complete. All A2C2S systems are to be transitioned from the PM to respective units where unit support will maintain the systems until capability termination or replacement

COBRA-BASED BLUE FORCE TRACKING (BFT) SYSTEMS AND SUPPORTING ARCHITECTURE

The MTX is the current DoD BFT system that leverages existing national space infrastructure/ National Technical Means (NTM). These devices give commanders the ability to track and receive position location information (PLI) and short brevity codes, in near real-time, from friendly forces requiring a extremely secure, low probability of intercept/low probability of detection (LPI/LPD) C2 link. These systems substantially enhance security and reliability through the use of LPI/ LPD COBRA (collection of broadcasts from remote assets) waveforms, encryption certified by the National Security Agency, and military GPS. SMDC/ARSTRAT's BFT Mission Management Center (MMC) supports MTX use of the existing COBRA architecture by coordinating with national system managers and warfighting units to help collect, process and disseminate warfighter BFT data.

During OEF and OIF, SOF used the COBRA-based BFT systems due to the security advantages, while Coalition Forces Land Component Command main formations used FBCB2. Post-OIF I, (the MMC) has developed a capability to successfully integrate disparate BFT systems used by different units and Services into the COCOM's TOP COP, deliver these devices' PLI data via the Integrated Broadcast Service (IBS), and maintain special mission "discrete" BFT data feeds to those users requiring significant security. These BFT systems, the MMC, and the NTM architecture give operational-level commanders a substantially enhanced COP to date by increasing their situational awareness.

Program Status. There are approximately 6,000 MTX systems produced and fielded to USSOCOM components (e.g., every USAF Special Operations Command airframe and deployed ground team in support of OEF/OIF has an MTX), Other Government Agencies (OGAs), and all other services who have a specialized requirement for secure/LPI/ LPD BFT support. The MTX and the MMC were developed and fielded as a result of supplemental appropriations and budget additions, but have since been accepted as critical and indispensable support systems to the GWOT. The NRO has invested heavily in upgrading and expanding the COBRA support architecture to make it mission ready for DoD and OGA requirements.

FORCE XXI BATTLE COMMAND BRIGADE AND BELOW (FBCB2)

FBCB2 is a Joint interoperable, digital, battle command information system for brigade level and below. FBCB2 is designed to provide mounted and dismounted combat elements with near real-time, integrated situational awareness and C2 functionality. FBCB2 enhances the ability of tactical commanders to better synchronize their forces, achieve agility and gain a sense of the battlespace through improved situational awareness and better combat awareness reporting while on the move. FBCB2 is a key component of ABCS.

FBCB2 operates over both terrestrial communications networks and SATCOM networks. The system consists of a ruggedized computer with a touch screen and keyboard in which the Soldier sees either a digital map or satellite imagery overlaid with icons representing the vehicle's location, other FBCB2/BFT vehicles, known enemy units, and objects such as minefields and bridges. FBCB2/BFT was expeditiously fielded in reduced quantities to every MACOM as well as the USMC and United Kingdom forces participating in OEF and OIF. As a result of lessons learned in OEF/OIF, the Army revised its Army command plan to deliver a consistent solution across the force within the next 18-24 months in order to provide partial "good enough" capabilities over time. FBCB2 requirements were refined to accelerate fielding efforts (OIF-like capability) and equip the Active Component and activated Army National Guard units to the FBCB2 Fielding/Distribution Plan, the Key Leader Option (KLO) "minus" architecture by the end of FY05; equip Active units to the full KLO architecture by FY07; equip Active units to the modular architecture in accordance with the *Army Campaign Plan*; and equip the Army National Guard units to the modular architecture by FY11.

Program Status. FBCB2 is currently funded to continue improvements in Network Operations Center re-architecture, synchronization of software releases, new satellite architecture and waveform redesign to address latency issues caused by increased OIF/OEF system demands, the completion of Type 1 encryption efforts, the development of beacon capability (Integrated Data Modem and Electronic Data Manager), dismounted vehicular product development, logistics product development, and Internet Protocol v6 development.

SINGLE CHANNEL GROUND AND AIRBORNE RADIO SYSTEM (SINCGARS)

SINCGARS provides commanders with a highly reliable, secure, easily maintained combat net radio that has both voice and data handling capability in support of C2 operations. SINCGARS, with the Internet controller, provides the communications link for the digitized force. The Advanced System Improvement Program models are of a reduced size and weight, providing further enhancements to operational capability in the Tactical Internet environment.

Program Status. SINCGARS continues to be the workhorse in the Army. FM Combat Net Radio in OIF/OEF are being fielded to Active, Army National Guard, and Reserve forces in current operations as well as supporting Army transformation.

Appendix 6: Net-Centric

THE NETWORK

LandWarNet, the Army network, in conjunction with the Navy's FORCEnet and Air Force C2 ConstellationNet are major service initiatives to advance net-centric capabilities. Concepts for network-centric warfare, full-spectrum dominance and decision superiority are driving C2 modernization efforts for the Army's current and future Modular Forces and the Joint Force. These concepts require a robust, modular, deployable and always capable network that provides universal access to all relevant authorities, assets and capabilities. This network consists of integrated information systems, supporting information infrastructure and a knowledge-based force of individuals located across the entire spectrum of the battlefield from the Soldier on point, through a variety of operations and support centers in theater, to home station operations and support centers located worldwide. To achieve this level of networking, the focus is being shifted from a bottom-up to a top-down approach that develops integrated C2 network architectures designed to support battle command capabilities for the current and evolving future combat force in the Joint, full-spectrum operational environment. The Army is currently identifying baseline network capabilities for the Joint environment and will use a single Army lead for network development to enhance the current Modular Force and accelerate network development for the future.

THE NETWORK ENABLER

The Army's ongoing transformation to net-centricity has significantly increased Warfighter dependence on spectrum. The Army recognizes

that it must pursue modernization objectives with a clear understanding of the relationship between the tenets of net-centricity and the electromagnetic spectrum. Net-centricity depends upon an environment that provides full connectivity and interoperability to produce and share a common understanding of all dimensions of the battle space. This DoD construct called the Global Information Grid is implemented in the Army as the Army LandWarNet, supports the Joint vision for achieving information superiority and is the chief enabler for the Warfighter. LandWarNet provides an end-to-end set of information services, associated processes, and people to manage and provide the right information to the right user at the right time with appropriate protection across the DoD warfighting, intelligence, and business mission areas. Like the GIG, it is created through the implementation of highly integrated wireless architectures and spectrum-dependent technologies to instrument and network the battle space. The radio frequency spectrum is the essential resource enabling the operation of wireless networks and vital components on virtually every tactical warfighting system. Spectrum-dependent systems include communications and weapons systems, precision munitions, sensors, geo-location, and other wireless devices. Effective command and control, robust warfighting capabilities, and personnel safety are directly dependent on the assured availability of these systems, which are directly dependent on access to spectrum.

Access to and management of the radio frequency spectrum in particular directly influences how net-centric initiatives are realized. The Army must ensure that its modernization programs evolve by confronting and dealing with the inevitable future electromagnetic battle space challenges that arise as the density of electromagnetic emitters in a force increase. Specifically the development and employment of spectrum-dependent systems must proceed with careful adherence spectrum supportability factors and processes without which places combat capabilities at risk through the introduction of harmful interference into the battle space. Events in Iraq have highlighted the detrimental effect of interference on warfighting capabilities and have spurred multiple initiatives aimed to ensure that modernization programs comply with spectrum supportability guidelines.

DISCUSSION OF KEY NET-CENTRIC MATERIEL PROGRAMS

SATELLITE COMMUNICATIONS (SATCOM)

SATCOM systems provide a robust, flexible and seamless network capability that extends, and in some cases replaces, terrestrial capabilities with responsive, BLOS communications throughout the battlefield that permits users to access large databases necessary to support strategic, operational and tactical missions. SATCOM global connectivity supports the command and control capabilities of planning, coordinating, directing and controlling. SATCOM use is essential for the real-time direction of operations at each echelon of command. SATCOM enables tactical forces to exploit improved capabilities to coordinate fires; conduct operational maneuver on the unstructured, asymmetric battlefields of today; and assess the effects of previous operations and anticipate enemy actions. An integrated high-capacity SATCOM backbone provides reachback connectivity that allows implementation of split-based command and control and logistics support concepts. This architecture will also support interoperability with Joint, coalition, commercial and civil communications networks. As a result, current and evolving modular forces will have reliable, on-demand, BLOS/NLOS communications

for enhanced early warning, en route mission planning and rehearsal, and responsive CSS while maintaining a reduced footprint in theater. Reliable SATCOM enhances increased responsiveness, agility, versatility, survivability and sustainability." add, "SATCOM systems will increasingly support mobile warfighters with deployments of emerging systems including UHF SATCOM on the Move (SOTM), the Mobile Battle Command On the Move (MBCOTM) system, and the HC3 Comm on the Move (COTM) variant.

Program Status. The MILSTAR satellite Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T) provides a protected (anti-jam) wideband, BLOS capability for Army modular divisions, BCTs and SBCTs. The program is currently in production and continues to be fielded. The SMART-T terminal will be upgraded to utilize the Milstar Follow-on Advanced EHF satellite waveform, which will provide an increased throughput of up to 8 Mbps. Phoenix, an SHF multiband satellite terminal, HMMWV-mounted, air-transportable system was fielded in Jul 04. Tri-band terminals (X, C, and Ku) were fielded in FY04 and FY05. A quad-band upgrade in FY06 added Ka band. Phoenix will be fielded to Integrated Theater Signal Battalions (ITSB) FY04-08. The AN/TSC-85B and AN/TSC-93B are satellite X-band terminals used for BLOS range extension and reachback from deployed base to sustaining base in CONUS. Under the Army D Model System Life Extension Program, all AN/TSC-93C and AN/TSC-85C terminals (67 AN/TSC-85s and 107 AN/TSC-93s) will be sustained to operate at least until 2012, including those that will be cascaded to the Army Reserve and National Guard. A cascade and sustainment effort was executed in FY04 and will continue thru FY08. AN/TSC-85 and AN/TSC-93 terminals are fielded to round out the ITSBs. As part of the DoD MILSATCOM transformation efforts, the

Transformational Satellite (TSAT) system will launch in 1QFY16 and will provide future protected wideband services. The High Capacity Communications Capability (HC3) terminal is the Army terminal that will enable ground forces to utilize TSAT XDR+ waveform, both at the CATH and COTM modes. The terminal is scheduled for fielding in FY14. The HC3 will be a quint-band terminal (X, Ka, C, Ku, Q (XDR & XDR+). It will replace the TSC-85 and 93 terminals and augment the Phoenix terminals.

Spitfire upgrades to fully exploit the increased capability of the MUOS constellation will occur in concert with launch dates. Near term Air Force programs will drastically increase the available capability for Narrow, Wideband, and Protected communications.

COMBAT SERVICE SUPPORT (CSS) SATELLITE COMMUNICATIONS (SATCOM)

The CSS-SATCOM provides rapidly employed, BLOS communications-enabling hardware to logisticians at the tactical and operational levels. The program, which grew out of the Army G-4's Connect the Logistician focus area, provides COTS-based very small aperture terminals (VSAT) and a supporting global infrastructure to logistics activities integrated within and supporting the Army's Modular Force structure.

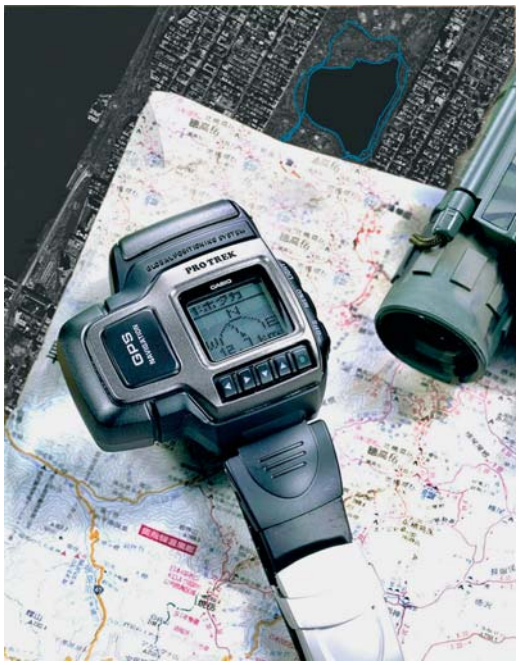
Program Status. With over 400 terminals in service, CSS-SATCOM has completed fielding to five divisions and 12 brigades in the Active and Reserve Components. The system is currently being fielded to the 25th ID and is aligned with the *Army Campaign Plan* for future fieldings.

GLOBAL POSITIONING SYSTEM (GPS)

GPS is a space-based radio Position/Navigation system that provides extremely accurate, continuous, all-weather, common-grid, worldwide navigation and three-dimensional positioning, velocity and timing information to land, sea, air and space users. These components are the space, ground control and user equipment segments.

Program Status. The Defense Advanced GPS Receiver (DAGR) began replacing the current Precision Lightweight GPS Receiver (PLGR) in modularizing and other high-priority units

in 1QFY05. The DAGR includes the Selective Availability Anti-Spoofing Module and other significant improvements including size, weight and battery requirements. The PLGR will be cascaded from units fielding the DAGR to fill authorized requirements in other units. The DAGR is projected to be replaced starting in FY13 by an improved Military (M)-Code capable handheld GPS device when the associated M-Code satellite constellation and ground control stations have reached FOC.



WARFIGHTER INFORMATION NETWORK–TACTICAL (WIN-T)

WIN-T is designed to provide the backbone of the tactical network, continuous and full communications-on-the-move (users and network infrastructure) capability at all echelons, Joint and coalition voice and data services to all command posts, a flexible and dynamic task reorganization capability, and a more survivable and less complex network. WIN-T's single integrated network will provide multi-level classified Joint and coalition voice and data services to all command posts. Conceptually, this is intended to eliminate the need for stovepipe (CSS-VSAT, Trojan Spirit, etc.) communications systems. WIN-T provides the key capability for on-the-move communications through a three-tiered architecture (ground, airborne, and space) that enables continuous network connectivity. The ground layer will equip Soldiers, sensors, platforms, command posts and access nodes (signal shelters) with integrated transmission (radio) systems, switching and routing capabilities that will serve as WIN-T points of presence (POPs). The airborne layer will serve as an access node and relay by positioning transmission, switching and routing capabilities onto airborne platforms. The space layer will serve as an access node and relay by leveraging the transmission, switching and routing capabilities provided on the satellite.

Program Status. The program is currently in its SDD phase. Milestone C decision is formally planned for 3QFY11 after which it will enter LRIP. The purpose of LRIP is to procure units leading to IOT beginning in 3QFY13 and continuing through 4QFY13. The IOT would be preceded by contractor and government product verification testing in 2012 and 2013.

The Army is presently examining how best to formulate a migration strategy from JNN to WIN-T. JNN was designed to be an immediate and quick fix to Mobile Subscriber Equipment (MSE) in order to support current rotations to OIF. JNN provides significant operational improvements over MSE, replacing that system in all units deploying to the CENTCOM Theater. The most significant improvement is the extension of communications capability down to the battalion level, providing beyond-line-of-sight connectivity, enhanced mobility and enhanced NETOPS capabilities. JNN does not have the mobility or full capabilities and capacities that WIN-T will provide to the Future Force.

JOINT TACTICAL RADIO SYSTEM (JTRS)

JTRS is a family (ground, airborne and maritime domains) of common software-defined radios that provide seamless network connectivity throughout the battlefield in support of Joint Vision 2020 objectives. JTRS is the military's affordable,

mobile, high-capacity, lightweight, multiband radio system providing simultaneous voice, data and video communications. JTRS will be a key component of the Tactical Internet and GIG using a family of network waveform applications. The Army is the executive agent for the JTRS program requirements, and the Navy is the executive agent for JTRS acquisition. The Army is responsible for two (Ground Mobile Radio (GMR) and Handheld, Manpack, Small Form Fit (HMS)) of the four primary product lines (GMR, JEM, HMS, and AMF). GMR is developing the ground vehicular radio, AMF is developing an airborne radio for Army rotary wing aviation platforms, and HMS is developing the handheld, manpack, and small form fit radios.

Program Status. The JTRS Joint Program Executive Office (JPEO) has restructured its program to ensure the GMR, HMS and AMF product managers deliver Increment 1 capability. Both GMR and HMS are in the SDD phase. Increment 1 Low Rate Initial Production (LRIP) for GMR is anticipated to begin in 2QFY11 and LRIP for the various HMS products ranges from 4QFY10 to 2QFY11. AMF is in the Pre-SDD phase and schedule for a Milestone B decision in 3QFY07. LRIP for the rotary wing radio is projected to begin in 4QFY11.

BRIDGE-TO-THE-FUTURE NETWORKS (BFN)

BFN is the Army's bridging strategy to deliver increasing net-centric capabilities into the current force today, and will be followed by the initial transition to the WIN-T capability. LandWarNet is the Army's contribution to the GIG—consisting of all globally interconnected, end-to-end set of Army information capabilities, associated processes and personnel—for collecting, processing, storing, disseminating and managing information on demand, which supports warfighters, policy makers and support personnel. It includes all Army (owned and leased) and leveraged DoD/ Joint communications and computing systems and services, software (including applications), data security services, and other associated services.

BFN is the Army's bridging strategy to deliver increasing net-centric capabilities into the current force today, and will be followed by the initial transition to the WIN-T capability. Capability enhancements within the Army's BFN strategy are increased voice, data and video services that are Joint network ready and supports the Army's modular designs. The BFN will provide the current force with a state-of-the-art COTS communications backbone network (high-speed and high-capacity) that will enable them to exchange information (voice, data and video) throughout the tactical corps and into the sustaining base.

The objective of the BFN is to incrementally insert increased capability, COTS solutions to the Army's current force to satisfy existing capability gaps. BFN capability increments build off the recapitalization of the current MSE and Tri-Services Tactical Communications (TRI-TAC) tactical communications systems. The Army's BFN CPD fuses the Army's Joint Network Node (JNN), Connect the Logistician–CSS, and intelligence Trojan Spirit initiatives into a single strategy to deliver increased capabilities to the warfighter today. The BFN capability increments build off of the existing Area Common User System Modernization Plan (ACUS MP) and recapitalization of the current MSE and TRI-TAC tactical communications systems.

Program Status. An updated requirement (Increment 1 with Annex 1 (JNN)) was signed by Headquarters TRADOC on 15 Sep 05 and given final approval with a signed JROCM on 18 Oct 06. The pursuit of COTS solutions facilitates rapid delivery of increased capability to the current Modular Force and supported combatant commanders. Enhanced capabilities will be defined and documented within future increments to the BFN CPD, and potentially a CDD.

JOINT NETWORK NODE (JNN)

JNN is the Army's modernization of the tactical battlefields transport network and provides interconnectivity with Army and Joint units and ties in NCES via the Defense Information Systems Network. Spiraling JNN into the force will provide

commercial satellite augmentation to Army MILSATCOM, Internet Protocol (IP)-based services, Voice over IP (VoIP) augmentation to Defense Switched Network (DSN), unclassified/classified Internet down to the battalion level, secure digital telephone down to brigade level, and situational awareness.

JNN provides a high-speed, high-capacity network communications backbone connection at the quick halt that is joint-capable, supports the warfighter's rapid movement and simultaneous operations, and disseminates information at unclassified and secret levels of security. Key items of the JNN architecture are the Regional Hub Node, Unit Hub Node, JNN node and BnCP nodes. JNN is to be designated a program of record

Program Status. In recognition of the aggressive schedule requirements and the needs of the current force warfighter for expeditious delivery of JNN-N capabilities, the Army Acquisition Executive directed a Milestone C decision review be executed in 2QFY07. JNN has been fielded to 70 percent of active Army divisions.

JOINT NETWORK MANAGEMENT SYSTEMS (JNMS)

The JNMS is a combatant commander and Joint task force communications planning and management system. JNMS provides commanders, combatant command, and JTFs with automated capability to plan and manage joint C4 networks. JNMS provides the means for timely decisions and synchronization of communication assets to support mission requirements, improves situational awareness by providing a common view of the network, provides the capability to better utilize scarce resources and to optimize the capacity of the network to support the Warfighter and provides transportable and deployable versions on laptops. JNMS provides specific planning, management and trouble ticket functionality for site specific requirements.

Program Status. APO validated by G-3 for 66 Network Planner Laptops, 53 Network Manager Laptops, 17 Trouble Ticket Laptops, six Network Manager Server Suites, three Trouble Ticket Server Suites.

ISYSCON V4 (TACTICAL INTERNET MANAGEMENT SYSTEM (TIMS))

ISYSCON V4 is the army's communication planning and engineering system for future, and contingency operations, brigade and below. ISYSCON V4 provides situational awareness of communications networks (Enables COP, FBCB2 to ABCS linkage and enables inter TOC communication). ISYSCON V4 provides critical network reconfiguration to enable Unit Task Reorganizations. The system consists of three configurations: 1) Paravant Applique and One Panasonic CF-28/29, 2) One Panasonic CF-28/29 "Toughbook" computer, and 3) Two Panasonic CF-28/29 "Toughbook" computers.

Program Status. The program is currently providing ABCS and network system management hardware/software tools to converting modular forces in accordance with the *Army Campaign Plan* and the Army Priority List. The program is currently funded to deliver required quantities to converting and FY06 and 07 deploying OEF and OIFunits.

CRYPTOGRAPHIC MODERNIZATION PROGRAM

Cryptography is an integral part of all Army Communications and National Security systems. Cryptographic Modernization is the incremental replacement of an aging cryptographic equipment inventory and is critical to meet technological improvement requirements. Improvements may be in the form of improved algorithms, expanded capabilities, or new and emerging technologies. Cryptographic Modernization shares the same tenets with the Key Management Infrastructure that allows adaptation with evolving mission demands of the Net Centric Global Information Grid. Components must be jointly interoperable, yet the challenge is that backward compatibility must me designed in to allow a smooth transition. For

modernization, besides strengthening algorithms, the desirable core capabilities derived from the latest technological innovations are:

- Programmable/Downloadable Algorithms
- Embeddable Solutions (Whenever Possible)
- Scalable Components (Software/Component Upgradeable)
- EKMS/KMI Compliant (Over-the-Network Keying)
- Network-Ready (Network Awareness, Plug and Play)
- Interoperable with Legacy Components (High Assurance Internet Protocol Interoperability Specification [HAIPIS])

Program Status. Currently the Program is working strategies for upgrade and replacement for Bulk/Link and Network Encryption devices. The Army's requirements as a whole are being examined through survey with users to determine proper application and quantities.